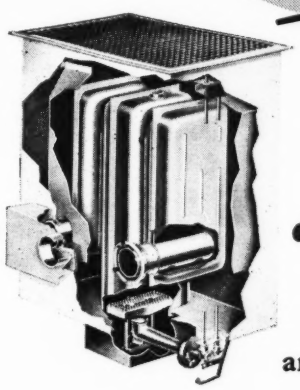
GAS

ENGINEERING • UTILIZATION • LOAD-BUILDING • MANAGEMENT



. . . Payneheat on the air. . . . .

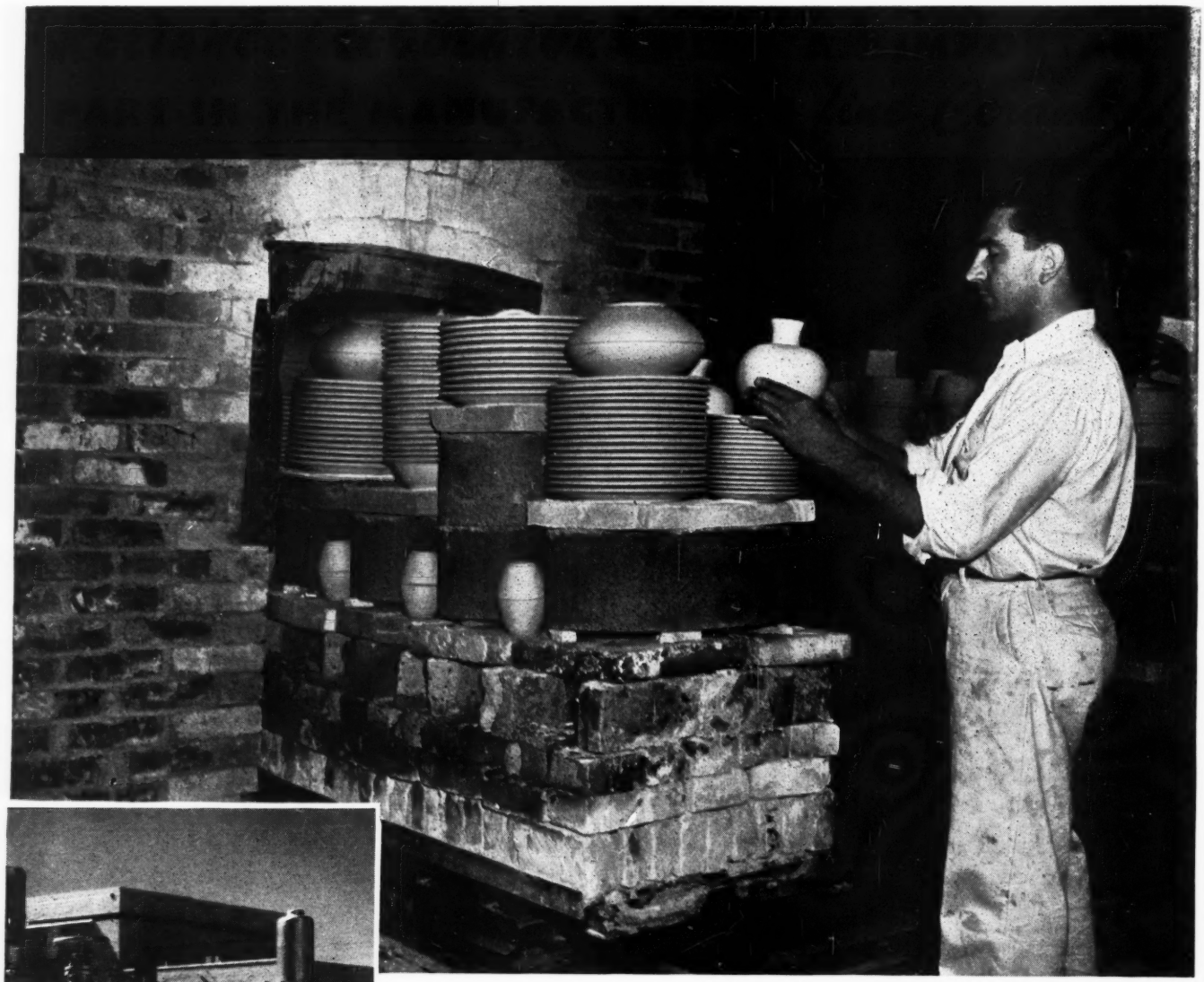
Every day millions of people across the entire country are hearing about PAYNE GAS FURNACES on their radios.

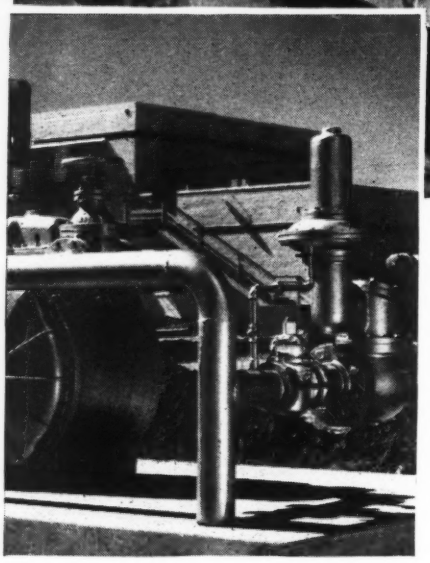
On their favorite programs Easterners, Westerners, Northerners and Southerners hear the name PAYNEHEAT . . . a trusted old friend in house heating . . . with a new concept in home comfort.

With the speed of sound the name PAYNE is carried from coast to coast into the homes of your customers. The complete story of this fine line of heating units is being told directly to the people most concerned . . . the people who BUY.

GAS FUEL HAS EVERYTHING
Payneheat
OVER THIRTY YEARS OF LEADERSHIP

PAYNE FURNACE COMPANY
(One of the DRESSER Industries)
BEVERLY HILLS, CALIFORNIA





Above illustration shows a Reliance Combination Balanced Valve and an American Metric Ironcase Meter. Together they efficiently control gas pressures and maintain constant temperatures in many of today's modern industrial plants.

The art of the potter consists of the shaping of certain earthy materials, usually clay, formed while moist and soft *and hardened by heat.*

In the preparation of fine quality pottery, a positive control of temperature in gas fired ovens is an absolute necessity. And it is in the positive control of these temperatures that Reliance Regulators play their important part.

For over thirty-four years Reliance Engineers have worked with industry to perfect the flawless, trouble-free performance built into every Reliance Regulator—performance you can depend on regardless of requirements.

Reliance Regulators are made in types and sizes most needed by the gas industry—production, distribution, industrial, domestic — for natural, manufactured and liquid petroleum gases.

Reliance bulletins give complete information. Write TODAY for your copy.

AMERICAN METERS

RELIANCE REGULATORS

4 GOOD REASONS WHY

YOU SHOULD USE

Rockwell-Emco GAS APPLIANCE REGULATORS

WITH PRESSURE CAST ALUMINUM ALLOY CASES

(All Sizes A. G. A. Approved)

1 To Get PEAK PERFORMANCE

A combination of large, smooth-walled internal flow passages, generous size valves and seats plus careful, studied proportions for diaphragms and springs results in unexcelled operating characteristics with respect to capacity, control accuracy and durability.

2 To Get COMPACT DIMENSIONS

The whole line, size for size, has been engineered to provide full maximum capacity (A.G.A. approved ratings) within the smallest possible overall dimensions. These regulators will tuck away in the close quarters demanded by modern appliance control housings.

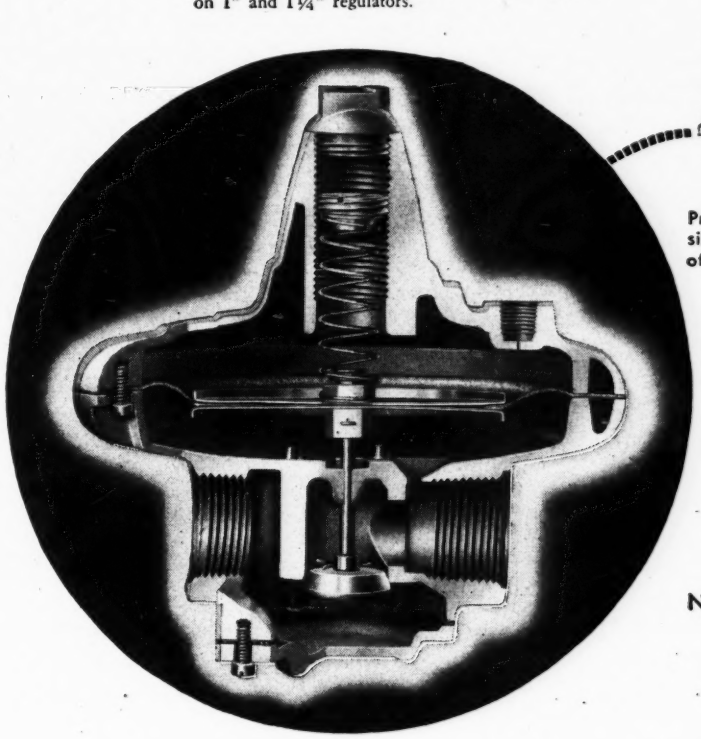
3 To Get LIGHT WEIGHT

Rockwell-Emco appliance regulators are made in the popular size range with durable, non-corrosive pressure cast aluminum alloy bodies and covers. Their light weight saves in shipping and handling; also reduces the overall weight of appliances to which they are attached.

4 To Get ATTRACTIVE STYLING

The eye-pleasing proportions of Rockwell-Emco appliance regulators naturally harmonize with the lines of modern gas appliances and the smooth exterior surfaces are finished with a protective coating of neutral gray lacquer that blends with any combination of colors.

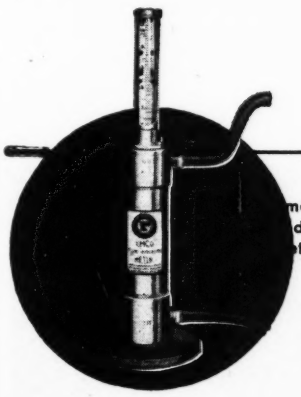
These regulators are made with aluminum cases in sizes from ⅛" through 1¼". Sizes 1½" through 3" available in cast iron. Screw connections are standard with flange connections optional on 1" and 1¼" regulators.



THE EMCOVENT
Protects against excessive leakage in event of diaphragm rupture.

We can make immediate deliveries! Write for bulletin 1136 *and price list.*

Adaptable to Natural, Manufactured and LP-Gases



PITTSBURGH EQUITABLE METER DIVISION

ROCKWELL MANUFACTURING CO. • PITTSBURGH 8, PA.

Atlanta Boston Chicago Houston Kansas City
Los Angeles New York Pittsburgh San Francisco Seattle Tulsa

mco
dicating
ter

SAVE TIME AND MONEY!

When Installing or Adjusting Appliances

The Emco Flow Indicating meter is the handiest tool in any appliance man's kit. For with it he can speedily adjust appliance burners to prescribed flow rates without recourse to a bulky test meter and stop watch Emco Flow Indicating meters read directly and instantaneously in cfh. Have accuracy comparable to that of a dry test meter Made in three sizes, all portable. Carrying cases available. Economically priced. Write for bulletin 1037.

ADVERTISERS

American Meter Co. 10, 11
American Radiator & Standard Sanitary Corp. 65
American Recording Chart Co. 103
American Stove Co. —
Ansul Chemical Co. 105

Barrett Division —
Blaw-Knox Co. 14

Carbide & Carbon Chemical Corp. —
Cast Iron Pipe Research Association 6, 7
Chaplin-Fulton Manufacturing Co. 18
Clark Brothers Co., Inc. 15
Cleveland Heater Co., The 98
Cleveland Trencher Co., The —
Connelly, Inc. 107
Continental Water Heater Co. 100
Cooper-Bessemer Corp., The o
Crane Co. 30

Day & Night Manufacturing Co. 79
Cribben & Sexton Co. —
Dearborn Stove Co. —
Detroit Brass & Malleable Works 19
Detroit Mich. Stove Co. —
Detroit Lubricator Co. —
Dresser Industries, Inc. Front Cover, 5, 15, 17, 28, 70
Dresser Manufacturing Division 28

Empire Stove Co. 94
Fisher Governor Co. 4
Florence Stove Co. —
Fraser 97

General Controls Third Cover
General Gas Light Co. 91
General Paint Corp. Hill Hubbell Division 104
Grayson Heat Control 73
Greenlee Tool Co. —

Hammel Radiator Engineering Co. 99
Hamilton Manufacturing Co. 76
Hardwick Stove Co. Fourth Cover
Harper-Wyman Co. 88
Heatway —
Heckethorn Mfg. & Supply Co. 106
Howard Supply Co. 8
Hydrauger Corp., Ltd. —

Inland Manufacturing Co. 96

Johns-Manville 111

Kaiser Fleetwings, Inc. 61
Kitson Co. 106

Lake Chemical Co. —
Lawrence Pipe Co. 102
Lube Jack Co. 102

Mettler Co., Lee B. —
Milwaukee Gas Specialty Co. —
Minneapolis-Honeywell Regulator Co. 83
Mueller Co. 110

Naco Mfg. Co. 87
Natural Gas Equipment, Inc. 68
Natural Gas Odorizing Co. 110
National Tube Co. —
Nordstrom Valve Co. —
Norton-McMurray Manufacturing Co. 107

Oil Well Supply Co. —
Oronite Chemical Co. 22

Pacific Gas Corp. 20
Pacific Gas & Electric Co. 71
Payne Furnace Co. Front Cover
Peerless Manufacturing Corp. 112
Phillips Petroleum Co. —
Pittsburgh Equitable Meter Division Rockwell Manufacturing Co. Tin Meter Division 1 —

Reliance Regulator Corp. Second Cover
Reynolds Gas Regulator Co. 16
Rheem Manufacturing Co. 101
Roberts-Gordon Appliance Corp. 112
Robertshaw Thermostat Co. —
Roper Corp., Geo. D. —

San Diego Gas & Electric Co. 67
Security Manufacturing Co. —
Servel, Inc. 84, 85
Sharples Chemicals Inc. 13
Smith Corp., A. O. 81
Southern California Gas Co. 75
Sprague Meter Co. 24
Stacey Brothers Gas Construction Co. 17
Stacey Dresser Engineering Division 5

Tapecoat Co., The —
Thermac Co. 3
Titan Valve & Manufacturing Co. 93

Union Carbide & Carbon Corp. —
U. S. Pipe & Foundry Co. —
United States Steel —
Utility Appliance Corp. 12

Vulcan Proofing Co. 21

Walworth Co. 26
Ward Heater Co. 62
Warren Petroleum Corp. 109
Welsbach Corp., The 106

Zink Co., John 108

GAS

REG. U. S. PATENT OFFICE

Twenty-Third Year of Publication

Vol. 23—No. 9 CCA **September, 1947**

COMMENT

Highlights 23
Thermally Thinking 25
Technical Trends, *by Guy Corfield* 27
Promotional Notes and Notions, *by Stanley Jenks* 29

ARTICLES

The PCGA Convention 31
Visual Education, *by Lauran G. Clapp* 34
Double Play 37
Student Engineers Handle Changeover, *by S. S. Caldwell* 40
Variable Area Meters, *by Harvey Krouse* 41
Free Service—Problem Child of the Industry, *by Schuyler F. Baldwin* 45
Radiant Heating at the Baseboard, *by W. S. Harris* 50
Burner Port Chart, *by P. A. Ray* 54
Mixing Oil Gas With Butane, *by D. B. Larson* 58
Purging Lines With Inert Gas, *by K. B. Anderson* 59
GAS' Digests 78

DEPARTMENTS

Associations 63
Operating Ideas 92
New Products 96
People 103
Sales Slants 107
Current Reading 112

Publication Office

LOS ANGELES 14, California, 1709 West Eighth Street, DRexel 4337.

Branch Offices

DAVID CARMEN, Manager, **CHICAGO 3,** 1064 Peoples Gas Building, WABash 2589

GERARD A. REGAN, Mgr., **NEW YORK 17,** 52 Vanderbilt Ave. MUrray Hill 4-1880

ROBERT B. FARSON, Manager, **DALLAS 8,** 2411 Nicholson Drive, YAle 2-9455

Executive

JAY JENKINS .....President and **Publisher**
JAMES E. JENKINS.....Secretary-**Treasurer**

Editorial

BILL CLARK.....Managing Editor
GUY CORFIELD.....Technical Editor
EDWARD TITUS.....Eastern Editor
PAUL LADY.....Assistant Editor
O. D. HALL.....Mid-Continent Editor
FREDERICK L. DALTON.....Art Director

September, 1947, Volume XXIII, No. 9, GAS, is published monthly by Jenkins Publications, Inc., 1709 West Eighth Street, Suite 320, Los Angeles 14, California. Subscription price: United States, Canada, Mexico, Cuba, South and Central American countries (in advance), 25 cents the copy; $2.00 per year. All other countries, $3.00 per year. Acceptance under the Act of June 5, 1934 was authorized February 26, 1946. Member: The Controlled Circulation Audit, Inc. Publishers: BUTANE-PROPANE NEWS; Handbook BUTANE-PROPANE GASES; BOTTLED GAS MANUAL, WESTERN METALS.

Highlights

CALIFORNIA END OF BIGGEST INCH NEARS COMPLETION. Southern California and Southern Counties Gas Co.'s expected to have their portion of the pipe line from Texas completed by mid-September. Appropriate ceremonies were planned for the "golden weld." Until the Texas gas arrives, the line will be used as a high pressure storage holder. Capacity, 100 MMcf at 300 psi.

BURTON BEHLING'S NOMINATION GOT NOWHERE. Recess caught up with the Senate before it could settle the wrangle over the nomination of Behling to the Federal Power Commission. Now it may be submitted again next session. In the interim, speculation ran to both opinions on whether the President could make a recess appointment for Behling to serve until the next session of Congress. Some said he couldn't—that such a move could only take place when the vacancy occurred during a recess. At any rate, experts say that the commission is bound to run into 2-2 deadlocks unless a fifth man is named.

END OF AN ERA. Last month Washington (D. C.) Gas Light Co. started junking two big holders, relic of manufactured gas days. With natural gas now going into the Washington mains, and only one manufactured gas plant now in operation, the two holders—capacity, 591 Mcf and 682 Mcf—are superannuated. One was 90 years old.

SCHWABE BILL BECOMES LAW. One natural gas bill got through Congress safely this session—and past the President, too. The Schwabe bill, HR 2956, providing for eminent domain by natural gas companies seeking rights-of-way for construction of lines, received the President's signature last month.

GAS FROM WOOD SCRAP? Vancouver, B. C., is initiating experiments to utilize some of the 3000 cu. yds. of wood scrap now being dumped every day. B. C. Electric Railway Co. and the city research council are reported to be backing the project. (See Page 77 for details.)

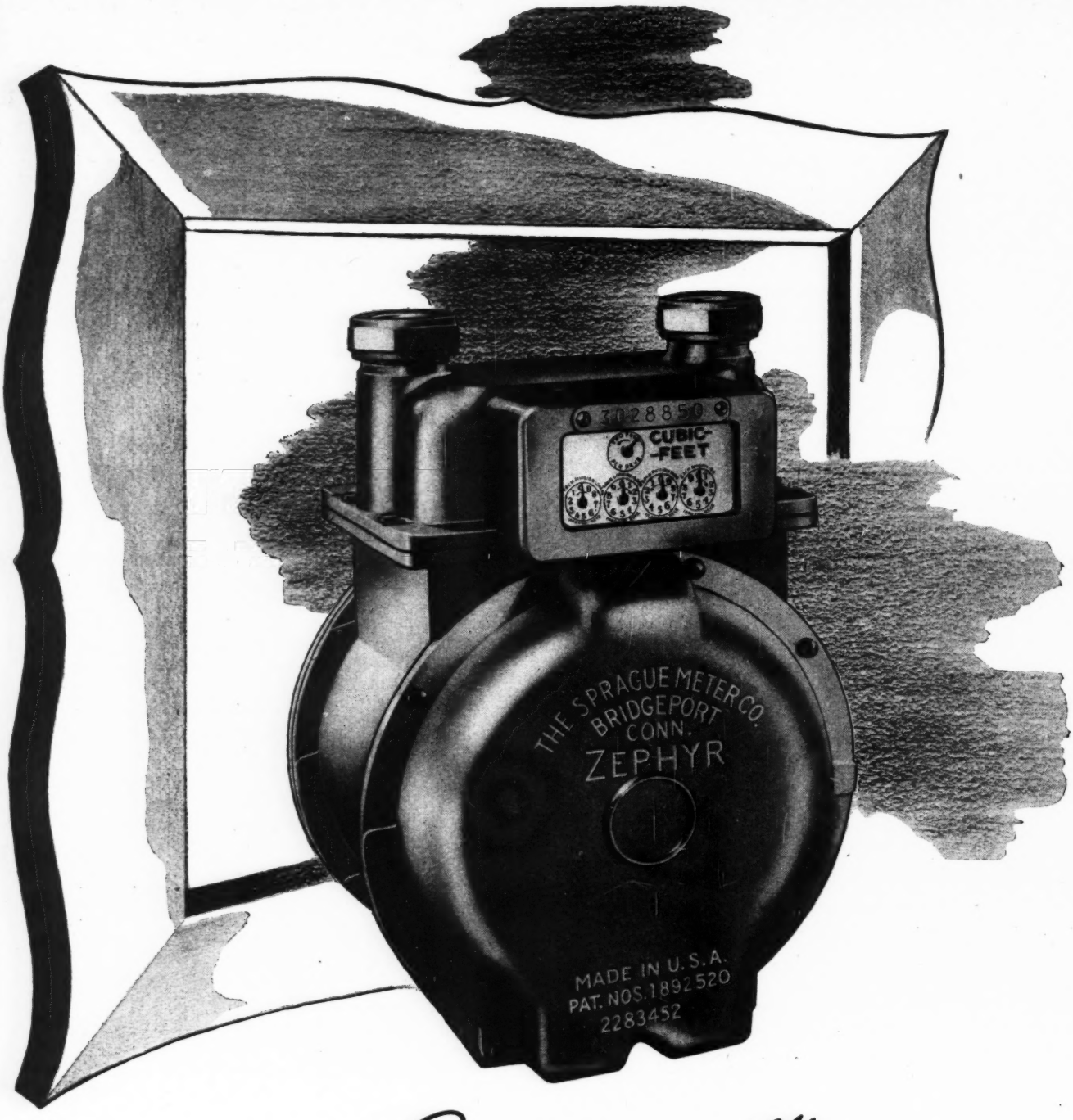
COAL AND THE RAILROADS WITHDRAW EXPANSION BLOCK. "Upon assurance it would not be used to develop new users for natural gas," the Anthracite Institute and railroads withdrew opposition to the Manufacturers Light and Heat Co.'s (Pittsburgh) application to build a 125-mile $5 million line to Port Jervis, N. Y., from Coatsville. The application has been approved by the Pennsylvania Public Utilities Commission.

LONE STAR BUYS $12 MILLION WORTH OF EXPANSION. Facilities to serve more towns in its area, as well as recycling plants, main lines, distribution systems, and compressor stations are included in the program of the Dallas company. (See Page 70.)

FPC ADOPTS SELF-RESTRICTIVE RULE. The commission-proposed amendment to its General Rules, passed last month, assures to independent operators engaging solely in production or gathering for sale at arm's length, non-interference from the commission itself. The rule was intended to clear up "existing uncertainty" arising from the Supreme Court decision in the Interstate case. Commissioner Draper dissented.

MICHIGAN CONSOLIDATED WINS FIRST ROUND AGAINST PANHANDLE. Panhandle Eastern Pipe Line Co. was ordered to show cause why it should not be permanently restrained from limiting its deliveries to Michigan Consolidated to less than 125 MMcf per day. The utility charged the transmission company with attempting to divert gas to better paying customers in Canada. Further hearings were scheduled.

CONGRESS MAY INVESTIGATE FPC "LOBBYING." After his bill to amend the Natural Gas Act had failed to get through the just-ended session of Congress, Rep. Ross Rizley (R-Okla.) charged the FPC with "intense, dishonest, and vicious" lobbying against the measure. He threatened to bring impeachment charges against several members of the commission who, he said, violated a statute forbidding federal officials from engaging in lobbying. Clare Hoffman of Michigan announced that his Subcommittee on Extra Legal Activities in Departments, would investigate the allegations.



To-morrows' Meter · · TODAY

The Sprague line of Zephyr meters offer the ultimate in accurate, dependable gas measurement. They are streamlined, light to handle, and economical to maintain. A complete line of these aluminum alloy meters can be had in capacities ranging from 175 to 1000 cubic feet per hour. Write for Bulletin 24A.

THE *Sprague Meter* COMPANY

BRIDGEPORT, CONNECTICUT

Informed Opposition

SOUTHERN California and Southern Counties Gas Co.'s of Los Angeles, who are building a line to bring into California volumes of natural gas up to 305 MMcf per day, have negotiated an agreement with Pacific Gas & Electric Co., gas suppliers for central and northern California, whereby the two southern companies would sell to Pacific quantities of gas ranging from 50 to 100 MMcf per day for a period beginning not later than April 1, 1948, and running approximately 5½ years.

The provisions of the contract are somewhat involved, but in effect it will advance the date when the capacity which the pipe will bring into the state will be reached. Instead of being limited to 175 MMcf per day through 1951, the huge line would carry its most economical load, 305 MMcf, beginning early in 1949. Northern California users would benefit from the volumes they would receive, and would take a certain quantity of gas which southern California could not absorb. The plan entails providing certain volumes after Southern California's firm load is satisfied; and certain other volumes after its interruptible load is provided for, as explained in more detail in the "News" section of this issue.

The advantages of the plan are obvious to everyone—nearly.

When the hearing was opened by the California Public Utilities Commission Aug. 21, there was no effective opposition, and though it diligently questioned assembled officials of the three utilities, the commission appeared satisfied that the contract was a wise one. Although at this writing that body has not yet passed on the contract, it would seem a safe bet that it will; unless, of course, it accepts the recommendations of the California Manufacturers Association, which asked that northern California be given no gas until the winter of 1948-49, when the full 305 million would be flowing into the state.

It would seem hardly likely that the commission would accept the recommendations of the small but voluble opposition which grabbed for straws to support a weak (or nonexistent?) case.

Opposition is a healthy thing. A critical attitude must be assumed by the state commission until it is convinced that a proposal is beyond a reasonable doubt a beneficial one to the people of its state. Senseless intervention, on the other hand, merely for the sake of earning a retainer fee is without justification.

The intervenor—the same, by the way, who reportedly opposed the introduction of Texas gas into California in the first place—represented a number of interruptible users in southern California, and therefore opposed the contract on the basis that it would take needed volumes from their customers in order to serve customers in the north. They also purported to represent interruptible users in the north, but why confuse the issue any more than they did?

Oh, there were other reasons. PG&E will pay 5 and 6 cents above the price at the California border, and therefore wouldn't they in effect be helping to pay for the line? Wouldn't California producers, seeing higher prices being paid for out-of-state gas than their own, raise their own prices? Etc., etc.

Finally, when all else failed, the antagonists asked that a decision be postponed until all evidence in Case 4591, the commission's statewide natural gas investigation, had been submitted. Having been started before the war, and although interrupted by it having consumed upwards of two years, the investigation might easily drag on past April 1, the last date the contract could go into effect. Unfortunately, even if the present case should not be concluded by Sept. 1, it would be nullified by failing to meet certain time restrictions set by El Paso Natural Gas Co., suppliers of the gas. In order words . . .

Yes, informed opposition is a good thing.

Streamlined

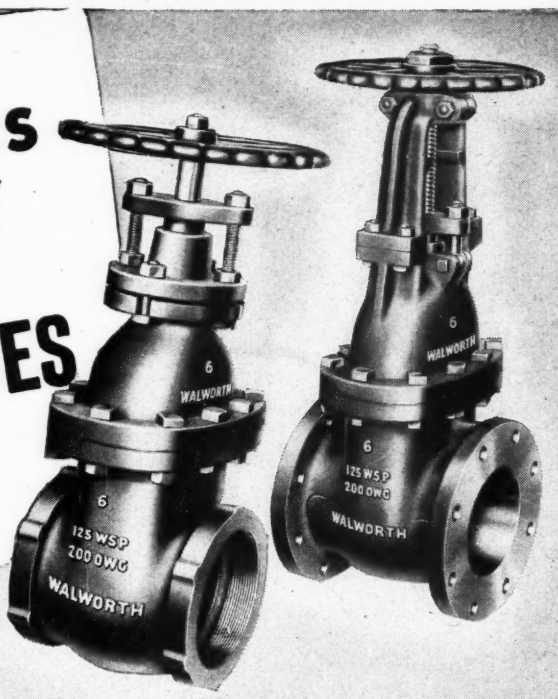
DOWN in the furthermost corner of the U. S. a small bit of gas industry history will be written late this month. There about a thousand gas men, mostly from the Pacific Coast, will gather to participate in what promises to be the first really post-war convention in the industry.

True, two years have passed since the war ended. True, too, the calendar was jammed with conventions in 1946. But here, in the Pacific Coast Gas Association's 54th annual convention, will be combined the brilliance of the "good old days" with the spirit of the new.

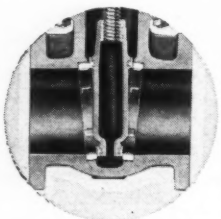
A very realistic view of convention purpose has been taken by the powers. The serious part of the program has been pared and tailored to fit the probable mood of conventioneers. No section meetings will usurp attention from the general sessions—none, that is, but the manufacturers section's single session, a very necessary event. And that will take place before the general session begins. All the subjects at general sessions will be Big Subjects. Developments of interest to sections are being aired at periodic meetings held frequently throughout the year—a plan permitting the most spadework to be done at the most propitious times.

Confusion attendant upon a packed program has thus been eliminated. It will truly be a streamlined convention—which is, after all, in keeping with the spirit, if not the body, of the bright new world.

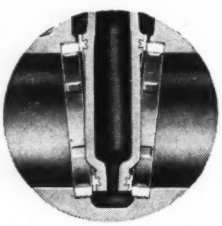
WALWORTH PRESENTS
A New Line of
IRON BODY GATE VALVES
with screwed or flanged ends



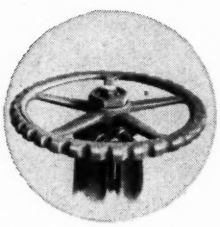
... 8 Outstanding Features



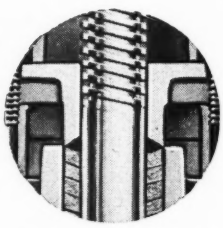
Straight-Flow Port Design reduces fluid turbulence to a practical minimum.



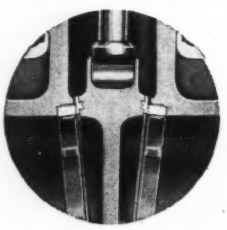
Seat Rings of end-seated type are screwed into the body.



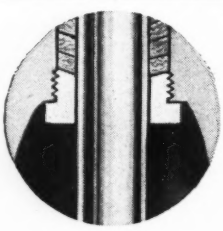
Sure-Grip Malleable handwheel for non-skid gripping even with heavy gloves.



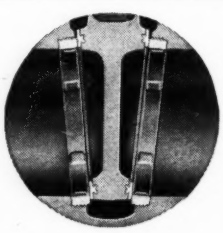
Brass Liner on Glands assures greater resistance to corrosion and scoring.



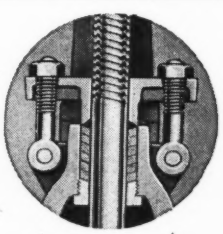
T-head disc-to-stem connection on OS&Y types provides stronger connection, prevents loosening of disc by corrosion.



Bronze back-seat bushings in bonnets of OS&Y valves.



Solid Web Type disc in OS&Y valves for greater strength and longer service.



Hinged Gland Eye-Bolts on OS&Y valves permit faster, easier repacking under full pressure.

WALWORTH
valves and fittings
60 EAST 42nd STREET, NEW YORK 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

For Complete Information on these new Walworth Iron Body Valves, write for bulletin 106.

TECHNICAL TRENDS

by Guy Corfield

Petroleum Exploration

THE American Petroleum Institute announces that during the annual period 1947-48 approximately $2 billion will be spent in production, which will include exploration and acquisition of potentially productive areas. Approximately 35,000 wells will be drilled, many of them exploratory. These plans were adopted in an attempt to keep up with the present unexpected and unprecedented demand for petroleum products following the recent war period, during which normal expansion and exploration were not possible. The API stated that, like everything else, oil exploration and production expenses have increased enormously. They are said to be three times greater than they were 10 years ago.

An interesting issue in this connection is the June 23 decision of the Supreme Court that the ocean beyond low tide mark comes under the domain of the federal government as regards offshore oil production. This is particularly important to California, Texas and Louisiana. At present it appears that existing operations can continue, although royalties may be impounded and ultimately paid to the federal government, rather than to the states as formerly. New drilling, however, may be temporarily stymied as the states are not now able, and the federal government not yet authorized to issue new permits. Considerable litigation may ensue before the matter is clarified, not only in the nature of appeals to the general decision, but also in determining whether certain bays, harbors and estuaries are part of the ocean proper, or completely within state limits.

Packing vs. Bubble Plates

THE gas industry frequently employs processes involving separation, contact, etc., using towers or columns. These columns are conventionally of the bubble plate type, made of steel and cast iron. Often the liquids or gases contain or develop corrosive constituents, which attack the plates, caps and downflows as well as the column shell. As the corrosion proceeds, the products build up in the various passageways and impede the performance before actual perforation and failure takes place, but cleaning is as difficult as replacement is expensive. Furthermore, to build or replace entirely with clad or stainless steel or other non-corrosive metals is exceedingly expensive, and even though certain metals may be themselves corrosion-resistant they are not immune to mutual electrolytic effects under contributory conditions.

It would seem that if a packed column (i.e., a column of ceramic, glass or other inert material shapes) would give the required contact or separatory performance it would be (other than the shell) immune to corrosion. The shell itself could be clad or lined with relative ease.

Apparently the theoretical and practical aspects of

packed columns are not well understood and developed as compared to bubble plate columns, which is perhaps why packing has not been used to any great extent even for special purposes.

The June 1940 issue of "Industrial and Engineering Chemistry" presents a distillation symposium dealing to a large extent with packed columns, including a fundamental paper on "Theory and Performance of Packed Rectifying Columns." These articles could be of considerable interest and value if a study of the subject should be considered desirable.

The Scientific Method

CLIFFORD S. Rassweiler, vice president for research and development, Johns-Manville Corp. in the commencement address at the University of Denver, spoke on the subject of "Science and the Art of Living," according to the June 23 issue of "Chemical and Engineering News." Dr. Rassweiler stated that certain principles of modern experimentation in the physical sciences have been developed and used to enable scientists to achieve spectacular control over our physical surroundings. These principles have come to be spoken of collectively as "The Scientific Method" and are as follows:

1. A belief that every occurrence, no matter how mysterious, has a natural and understandable cause, and that with sufficient observation and work we can understand that cause and thereby control the occurrence for our own benefit.

2. A fundamental respect for facts and an unwillingness to accept or state a thing as being a fact unless it can be supported by a sound and convincing proof.

3. A determination to marshall and study all the facts relating to a given problem, discarding those which are not relevant, examining the reasonableness of those that remain, and determining whether there are enough facts to justify a conclusion.

4. A respect for the evidence and viewpoint of others and a determination not to allow one's conclusions to be swayed by prejudices or what he himself wishes were true.

5. A willingness to change one's opinion in the face of new evidence and new facts and the belief that, while truth itself is unchanging, our knowledge of it and our interpretation of it change as we gain new knowledge.

6. A determination not to proceed blindly but to plan and follow the course indicated by the best available information.

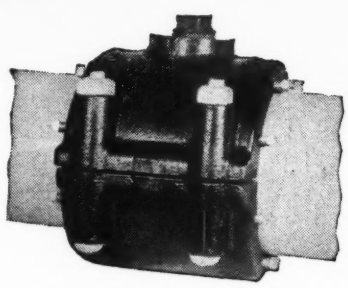
These six principles merit careful study and thought. They would appear to be applicable to any line of endeavor. They undoubtedly are a guide to technical research.

Order now for winter breaks

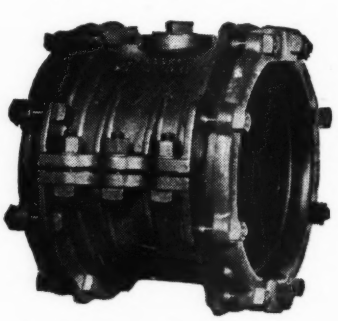
Be ready to make quick, permanent repairs when pipe breaks occur this winter. Order your Dresser Sleeve and Clamp requirements *now.*

We are building up our stock of split repair sleeves for emergencies, but it will be some time before we can get back to our fast, pre-war delivery schedules. Mail your orders today and you will have the sleeves when they are needed.

DRESSER MANUFACTURING DIVISION, BRADFORD, PA.
Houston Office and Warehouse, 1121 Rothwell St.,
Sec. 16, Houston, Texas.
In Canada, Dresser Manufacturing Co., Ltd.,
60 Front St., West, Toronto, Ont.



Style 80—Ready-Pack Sleeve. Light in weight, low in cost. Makes gas-tight repairs, even on off-size pipe. Completely encloses the break. A packaged, one-man repair for cast-iron pipe from 3″ to 8″ in diameter.



Style 57C—Cast Split Sleeve. Quickly installed. For cast-iron pipe 2″ to 12″ in diameter. Two or more of these sleeves can be joined together to enclose pipe breaks longer than 8″.

DRESSER **REPAIR CLAMPS AND SLEEVES**

ONE OF THE DRESSER INDUSTRIES

PROMOTIONAL NOTES AND NOTIONS

by Stanley Jenks

The Vital Flame

A British friend has sent me a copy of "The Vital Flame" by the well-known novelist Compton Mackenzie. "The Vital Flame" is not a whodunit or romantic novel, but is, in fact, just about as complete a story of the British gas industry as any layman could author, or any layman could read intelligently. It is illustrated with 42 color photographs and seven pages of isotype charts.

The history of the industry in the hands of a writer like Compton Mackenzie makes fascinating reading, surpassed only by the story of the gas industry's accomplishments during the war and at the present time.

Because we have so much in common, a book like "The Vital Flame" deserves to be "must" reading by every American gas man, especially those whose particular job is building public relations. (We all should be public-relations-minded at heart.) At least every gas company library should have a copy, which can be obtained from the British Gas Council, 1 Grosvenor Place, London S.W. 1, at a cost of $2.50.

Water Works Load

LAST month, in discussing the gas load value of the home laundry, I mentioned ozonation at the water works as an attractive gas load where none exists today. Several readers have asked for more details. So, as Bert Williams used to say, I'll elucidate with an example.

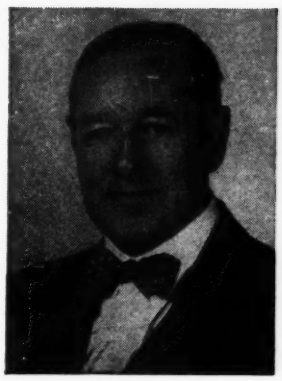
The amount of pollution in the water to be treated determines the "ozone demand" of that water. Let us say the "ozone demand" is 10 lb. of ozone per million gallons and the water works has a capacity of 5 million gal. daily. Ozone generating capacity of 50 lb. daily is needed.

Ozone for water works operation is generated by passing filtered, dehumidified air through the corona formed by the electric discharge between high tension electrodes. The air is dried by chemical adsorption to a minimum of —60° F dewpoint. A relatively small percentage of the oxygen in the air is converted to ozone. This calls for large volumes of air. In fact, to generate 20 lb. of ozone daily, we need to dry 1200 cu. ft. per hour or 28,800 cu. ft. of air a day.

The moisture collected by the adsorbent chemical needs to be removed. It takes approximately 120 cu. ft. of 1000-Btu gas per hour to reactivate this adsorbent chemical, according to the manufacturers of the air-drying equipment, who furnish it for steam, electric, *or gas operation.*

Unrestricted House Heating

THE removal of added home heating restrictions by the Westchester Lighting Co., subsidiary of the Consolidated Edison Co. of New York, is good news. Shortage



of production capacity, transmission and distribution facilities made the restriction necessary, and now, as far as a territory with 120,000 meters is concerned, the restrictions are removed. There are still 38,000 restricted meters, but it is hoped they will soon be unrestricted too.

As a former resident of Westchester county, I can testify to its merit as the premier residential attraction for New York's teeming millions. It attracts the type of people who appreciate better homes and who are normally good "prospects" for gas heating.

Having to turn down business is a tough experience, and the whole Eastern manufactured gas business, with few exceptions, has been put in this unfortunate position.

It is to be hoped that the good news out of Westchester county is the forerunner of similar reports from other currently restricted areas, because, as was shown on this page last month with Westchester county as the source, where gas in 1938 was used for central heating, it was used 100% for water-heating, 99% for cooking, and 50% for refrigeration. The refrigeration load would undoubtedly be much better today if conditions were normal.

Air-Conditioning

THE shortage of gas for additional winter heating in some areas is deplorable, but not necessarily as disastrous as some few jittery Jeremiahs would have us believe. There is still a summer valley that leaves us plenty of opportunity for our promotional talents. Naturally, I am thinking of the desirable load to be had by putting our present gas heating customers, with limited air-conditioning facilities, on a year-round basis. Summer air-conditioning with gas is the coming thing. It has all the advantages in this field that it enjoys in others.

The more people find relief in air-conditioned restaurants, movie theaters, trains, and stores from the sweltering humidity and oppressive heat, the more they want such relief at home. Some of them actually spend more money, in two or three years, for heat relief, moving the family to the mountains or the seashore, than the gas air-conditioning equipment costs.

I am not advocating by any means the abolition of vacations, but suggesting that many people who are now forced to pack up and endure the discomforts or price gouges of overcrowded resorts would rather stay at home if the cool comfort they need could be found there.

Why so much gas production piping is equipped by CRANE

ONE
SOURCE OF SUPPLY
RESPONSIBILITY
STANDARD OF QUALITY

No matter what piping equipment you need . . . valves, fittings, pipe, accessories, or shop-fabricated units . . . most likely Crane supplies it. Fast, modern service from nearby Crane Branches or Wholesalers brings you everything for the installation . . . and all on one order.

There's a real opportunity to standardize by working with the complete Crane line. It simplifies every piping job . . . from design to erection to maintenance. It pays big dividends because it gives you this important 3-way advantage:

ONE SOURCE OF SUPPLY offering the world's largest selection of steel, iron, brass and alloy piping materials for all power, process, and general service applications.

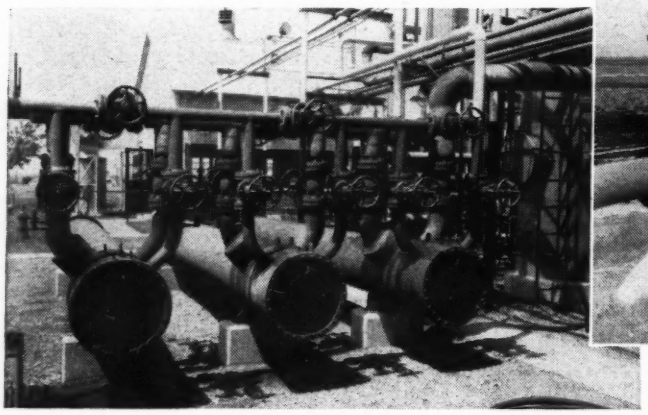
ONE RESPONSIBILITY for piping materials—helping you to get the best installation, and to avoid needless delays on the job.

OUTSTANDING QUALITY in every item—assuring uniform dependability and durability throughout piping systems.

CRANE CO., *General Offices:*
836 S. Michigan Ave., Chicago 5, Illinois
Branches and Wholesalers
Serving All Industrial and Gas Producing Areas

20-INCH LINES *to gas compressor station, before back-filling, featuring Crane No. 33XR cast steel wedge gate valves, bevel gear operated.*

HEAT EXCHANGERS *in a natural gas plant. Piping materials are steel, 4-inch, all from the complete Crane line.*



HIGH PRESSURE *incoming gas lines equipped with Crane 12-in. Ferrosteel gear-operated double disc gate valves.*

EVERYTHING FROM . . .

VALVES
FITTINGS
PIPE

CRANE

PLUMBING
AND
HEATING

FOR EVERY PIPING SYSTEM

Stately Hotel del Coronado, scene of the 54th annual convention.

IT might be the BIGGEST convention in Pacific Coast Gas Association history. And, quite possibly, the best.

It will be the 54th annual convention of the association, and the locale will be the beautiful, balmy isle of Coronado, just across the bay from San Diego, Calif.

Applications for reservations by late August had already swamped the Hotel del Coronado, swank headquarters for the affair, as well as San Diego's best hotels. Attendance promised to run to 900—possibly 1000.

The program is styled to suit the occasion, with the informative side of the picture being taken care of by a stellar group of authorities, headed by such men as Dr. Lee A. Du Bridge, president, California Institute of Technology; Capt. E. S. Pettyjohn, director, Institute of Gas Technology; R. H. Hargrove, AGA president, and a dozen other top names.

Entertainment, too, will be in keeping with the importance of the meeting. Augmenting the usual banquet and golf tournament will be a big party, evening trips to old Mexico, boat excursion, deep sea fishing, and swimming. Jai alia, the world's fastest and most dangerous game, will be played across the border for convention pleasure seekers; and all the sights of exotic Ti Juana will be on display.

Theme of the convention, the Biggest Inch pipe line, which will soon be bringing Texas gas to California, will be carried out in a preview of a color motion picture made along the route from the California border to Los Angeles; and talks by Paul Kayser, whose company, El Paso Natural Gas Co., is bringing the gas into the state, and Alden Roach, president of Consolidated Steel Corp., whose company fabricated the 30-in. pipe for the job.

The convention will get under way Tuesday morning, Sept. 23, with a meeting of the manufacturers section —the only section in the association to meet during the convention. This practice is a new departure, part of the streamlining designed to remove the conflict of meetings being held simultaneously—and to facilitate enjoyment of the purely social aspects of the event.

President Leroy M. Edwards, vice president, Pacific Lighting Corp., will open the first general session Tuesday afternoon, and will be followed by R. H. Hargrove's address, election of officers, and the presentation of a radio skit "The Gas Industry Is on the Air," prepared by C. W. Capwell of San Diego Gas & Electric Co.

The evening will be free for trips across the border.

Wednesday morning will be devoted to the Biggest Inch, with the motion picture and the talks by Roach and Kayser taking the entire morning. In the afternoon, topics of general interest will be discussed, ranging from atomic energy to regulatory problems and industrial relations. An association party is planned for the evening.

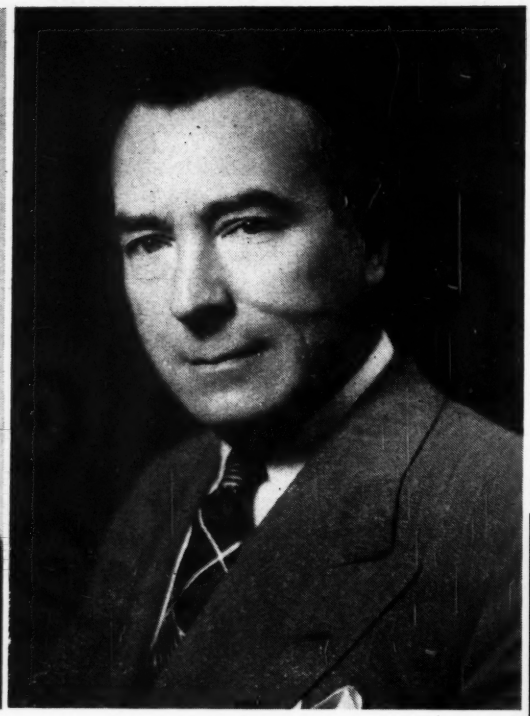
Promotion and research will take the spotlight Thursday morning, with most attention being turned to the Institute of Gas Technology. Customer relation and sales training talks will wind up convention business in the afternoon, with "Winning Seals of Approval," the AGA Laboratories film, an added attraction.

And finally, Wednesday evening, the traditional banquet.

Manufacturers Section

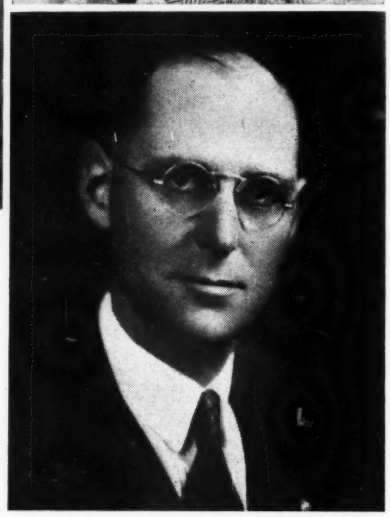
The manufacturers section annual meeting promises to be a major attraction in itself. Headliners will be

LEROY M. EDWARDS
Retiring President



A. H. SUTTON
President

A. F. BRIDGE
Vice President



D. G. MARTIN
Treasurer

NOMINEES

Chairman Henry Honer, D. P. O'Keefe, president of GAMA; Louis Ruthenburg, president, Servel, Inc.; H. Leigh Whitelaw, managing director, GAMA; and James I. Gorton, CP promotional director. Election of new officers for the coming year will also be held. Nominees for the positions are:

General Chairman: Henry Honer, president, Western Stove Co.
General Vice-Chairman: C. A. Gabriel, president, Monarch Heating Co.

Accessories Division

Chairman: M. M. Kennedy, treasurer, Domestic Thermostat Co.
Vice-Chairman: J. F. Ray, sales manager, General Controls Co.

Heating Division

Chairman: L. M. Hull, sales manager, Hammel Radiator and Engineering Co.
Vice-Chairman: J. P. Tuck, sales manager, International Sales Co.

Range Division

Chairman: W. M. Couzens, manager, Gaffers & Sattler Div., Utility Appliance Corp.
Vice-Chairman: A. M. Cramer, engineer, James Graham Manufacturing Co.

Water Heater Division

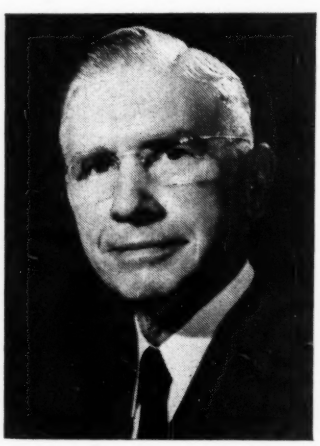
Chairman: R. H. Hinckley, sales manager, General Water Heater Corp.
Vice-Chairman: W. R. Smith, president, Continental Water Heater Co.

Directors of GAMA

Henry Honer and C. A. Gabriel, with M. M. Kennedy and R. H. Hinckley as alternates.

E. G. LAWSON
Director

HENRY HONER
Director



R. T. RICHARDS
Director

L. M. KLAUBER
Director

SPEAKERS

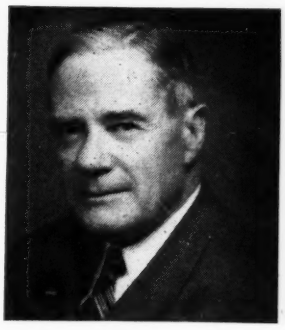
DR. L. A. DUBRIDGE

ALDEN ROACH

H. L. COSTELLO

HAROLD P. HULS

GUY W. WADSWORTH



PAUL KAYSER

R. H. HARGROVE

F. H. LERCH

H. CARL WOLF

TENTATIVE PROGRAM

TUESDAY, SEPT. 23

President's Address
Leroy M. Edwards

The Gas Industry Nationally
R. H. Hargrove, president
AGA; Texas Eastern Trans. Corp.

The Gas Industry Is on the Air
Radio stunt by C. W. Capwell
San Diego Gas & Electric Co.

WEDNESDAY, SEPT. 24

The El Paso Natural Gas Co.'s Part in Bringing Texas Natural Gas to Calif.
Paul Kayser, president
El Paso Natural Gas Co.

Steel Pipe for the Biggest Inch—A Western Achievement
Alden Roach, president
Consolidated Steel Corp.

The Biggest Inch—Preview of parts of a motion picture dealing with construction.

The Future of Atomic Energy
Dr. L. A. Dubridge, president
Calif. Institute of Technology

Equipment—Research in Action
Miss Elizabeth Sweeney
McCall's Magazine

Gas Industry in California and Its Future
Harold P. Huls, president
Public Utilities Commission

Industrial Relations Problems of Utility Companies
Guy W. Wadsworth, Jr., vice president
Southern Calif. Gas Co.

THURSDAY, SEPT. 25

The AGA Program and How the PCGA Can Help Put It Over
H. Carl Wolf, managing director
American Gas Association

Gas Industry Research
Capt. E. S. Pettyjohn, director
Institute of Gas Technology

The Institute of Gas Technology
F. H. Lerch, president
Consolidated Natural Gas Co.

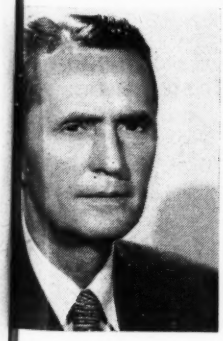
Gas Industry Promotion
D. A. Hulcy, president
Lone Star Gas Co.

The Use of Technology in the Administration of Service to the Customer
C. A. Renz, manager customer's service
Southern Calif. Gas Co.

The LP-Gas Business—What It Is and Who Does It
H. L. Costello, LP-Gas dept.,
Standard Oil Co. of Calif.

A Training Program for Company and Dealer Salesmen
R. C. Terradell, sales training head
Southern Calif. Gas Co.

Winning Seals of Approval
Sound motion picture in full color
Prepared by Promotion Bureau, AGA



C. A. RENZ

D. A. HULCY

E. S. PETTYJOHN

ELIZABETH SWEENEY

R. C. TERRADELL

VISUAL EDUCATION

San Diego Gas & Electric Co. utilizes instructional movies and slide films to educate salesmen, dealers, and public.

By LAURAN G. CLAPP

San Diego Gas & Electric Co.
San Diego, Calif.

THROUGH the use of motion pictures and sound slide films, the San Diego Gas & Electric Co. is conducting an effective promotional and educational program among its salesmen and the public which it serves.

Exclusive

Several years ago when appliance dealers and distributors were contemplating the possible end of the war and the resumption of aggressive merchandising, A. E. Holloway, vice-president in charge of sales for the San Diego Gas & Electric Co., offered to provide a sales training program for the hundreds of new salesmen who would be returning from the service and entering the appliance business for the first time.

So it was that in 1946, a visual education department was organized and put under the charge of World War II Veteran Dan Turner. The purpose of the department was, as Holloway put it ". . . to familiarize the salesmen and the public with the manifold uses and values of the utility's service."

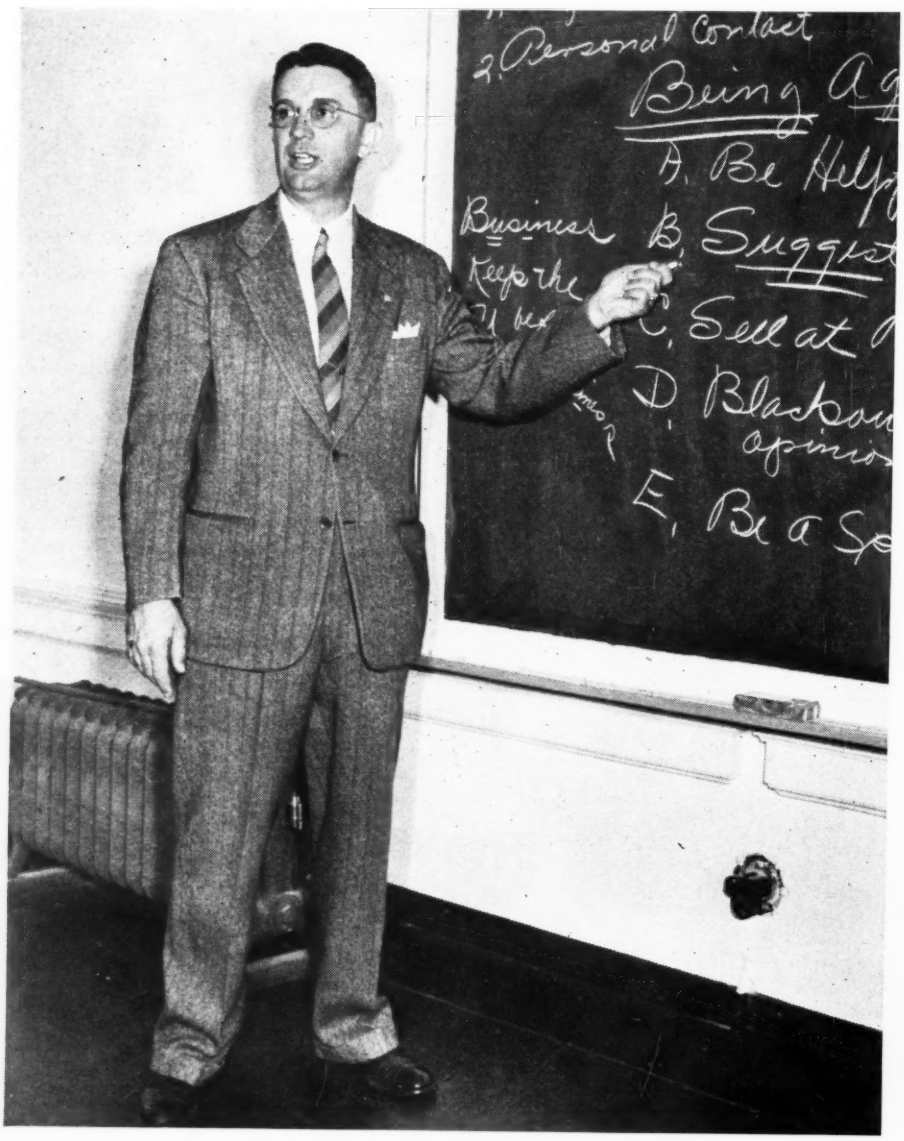
Starting with a library of only three films, the department has built up to 27 motion pictures and 37 sound slide kits covering important phases of the industry. Many of these films have been purchased outright from other utilities and large manufacturers, and some have been borrowed.

Employee Training Program

THE first employee training program given is the AGA course "The Fundamentals of the Gas Industry." To date, 347 individuals in the commercial and gas service departments and those in a supervisory capacity have completed the course.

This course consists of three sound slide films: "Gas, the Fuel," which outlines the history of the gas industry and stresses its fundamental advantages; "Gas, the Service," which emphasizes the importance of the gas industry to the country and the community and dramatizes the five necessary elements of free service that promote good public relations; and, finally, "Building the Gas Load," which shows the features of the New Freedom Gas Kitchen, CP range, gas refrigerator, gas laundry drier, and gas air conditioner.

When the company employs salesmen for the purpose of offering aid to new customers with their appliance and heating problems, the visual education department undertakes their pre-



A. E. Holloway, vice president in charge of sales, is enthusiastic over results of the visual education program instituted last year at the San Diego Gas & Electric Co. The audience includes dealers, salesmen, and customers; and among dealers and salesmen, some of the old timers in the business have been faithful attendants at classes, feeling that the program offered a means of unlearning some bad habits as well as learning new techniques. Directing the courses is Dan Turner, who is shown at left at the blackboard.

liminary training. The course consumes one month, and features talks by a representative from the personnel department and by division supervisors of the commercial department, the presentation of general training films, and company tours.

The course opens with an outline of objectives to be obtained, history of the commercial department, and a brief description of the department. A representative of the company's personnel department then delivers a series of lectures on such subjects as company history, the necessity for cooperation in a large company, suggestions on how to get along with the boss, self-analysis and improvement, how to give instructions clearly to others and get along successfully with fellow workers, and, finally, basic human needs and how a utility job enables one to satisfy them.

An entire half-day is allowed each of the supervisors to describe the work of their divisions of the commercial department. The trainees are given instruction on how to take applications for new service, handle the average complaint, figure gas layouts, and discuss intelligently the company's policy on new extensions.

Other subjects include a description of the work of the power sales, commercial lighting sales, and street lighting sales departments; industrial and commercial gas problems; gas space heating; rates and rate comparisons; the functions of the appliance dealers' association; and an outline of the company's advertising plans.

Men who are hired for the domestic sales division of the utility are given specific training concerning the rates, rules, and regulations of the company. The company's entire promotional programs are outlined in detail, and considerable time is spent discussing the particular advantages of each of the major domestic appliances. Instructions are also given on how to teach the customer to make minor appliance repairs and adjustments.

The men are given a complete course in sales training, using both the fundamental basic sales training course, "A.B.C.'s of Selling," employed for the appliance dealers, as well as the EEI course of eight films. Because the presentation of so much information in a short period of time would naturally tend to make even the most conscientious student weary, the day is divided among several different subjects. A typical day runs about as follows:

From 8 to 10 a.m. the time is devoted to sales training, with a review of the previous day's work and presentation of the next in the series of sound films on sales training, followed by a lively discussion emphasizing the points which the film brought out. From 10 a.m. to 12 noon, study is made of job functions and relationships. The entire afternoon is given over to a discussion of the work of the gas sales department.

During the last several days of the course each student is assigned for the entire afternoon to either the order, commercial lighting, investigation, customer extension, gas service, lighting service, or power service department. Near the conclusion of the course the group makes tours of the company's generating station, gas plant, shops, garages, and district offices. Finally, they are given instructions on how to make out their daily and monthly reports; and, following a final examination, the responsibilities of their new jobs are outlined to them and they are introduced to their new assignments.

Because of the success of this training program, the visual education department is now planning a similar course for the members of the gas service department. This course will be patterned along the lines now being devised by the sales educational committee of the Pacific Coast Gas Association.

Training Program for Gas Appliance Dealers

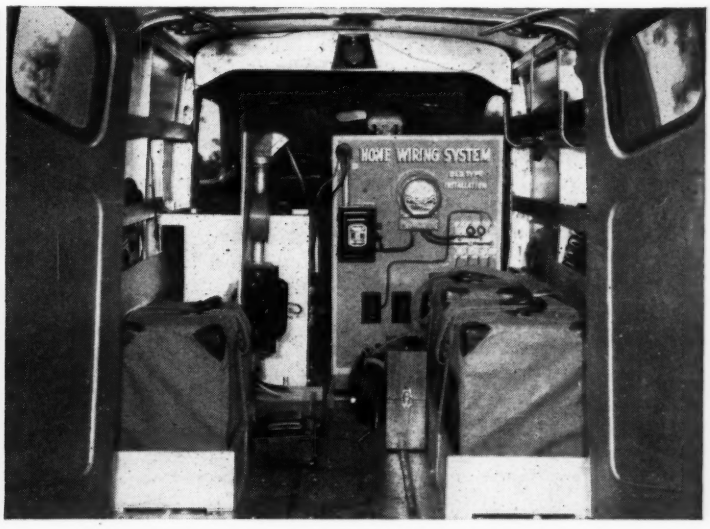
WHEN the appliance dealers of San Diego last year foresaw the need for a sales training program, the visual education department was consulted and a training program designed to provide basic sales training for the newcomers to the industry, as well as to refresh the oldtimers on the sales methods largely forgotten during the war.

The program consists of six 90-minute meetings, held in the morning from 8 to 9:30 a.m. in order that sales people will not be away from their work during store hours. The Jam Handy distributive education film, "A.B.C.'s of Selling," is used as a core of the program. This consists of a 20-minute sound motion picture and five sound slide films illustrating an important selling technique.

At the beginning of each class, a short review of sales material presented at the previous meeting is held; the next in the series of slide films is then shown, and then the class is opened for discussion. Members of the class recall from their own experiences problems similar to those illustrated in the film, and a proper solution is suggested. This generally results in lively discussion, the introduction of other problems, and new approaches to solving sales problems. Classes are limited in size in order to give everyone a chance for full participation in

Dan Turner conducts one of the salesmen's classes which are a part of the visual education curriculum.

Interior view of truck used in program, showing displays, sound equipment, and projectors for training.



the discussions. As "homework" the salesmen are asked to fill out questionnaires which require them to observe examples of selling technique in others.

During the series a representative from the San Diego utility presents a talk on "Rates as a Sales Tool and How To Use Them." Data is given the salespeople on the company's rate history, rates as compared with other cities and competitive fuels, with instructions on how to figure rates and apply them to sales.

A 30-minute sound motion picture, "The Voice of Mr. X," obtained from the telephone company, brings out the importance of developing a good telephone personality. At the final session a complete review of all material is held, a true-false examination given, and to offer comic relief the meeting ends with the showing of the Borden-Bussey film, "How to Win a Sales Argument." The homework questionnaires and the true-false examination are corrected by the visual education department and returned to the salesman's employer, together with a wallet-card stating that the salesman has successfully completed the course of salesmanship.

Since the opening of the series last fall more than 15 courses, or nearly 75 separate meetings, have been held to date, and well over 227 people have received their completion cards. Although the class was designed strictly for appliance retail salesmen, better than 15% of the enrollees have been store owners and employers themselves. Many distributors' salesmen have attended, feeling that they needed to "brush up" on selling techniques. A seasoned appliance salesman with 26 years' retail sales experience under his belt enrolled and completed the course "to break the bad habits which I have fallen into over the past four or five years."

Oldtimers in the appliance business were skeptical at first that there was anything new under the sun about sales that they didn't know. They came as curiosity seekers to the first meeting and remained to take the entire course. Early in the history of the program it was decided to separate the experienced from the inexperienced groups, since the more experienced sales people always took the lead in the group discussions and carried the meetings. As a consequence, the beginners' meetings are now held on Monday and Thursday mornings; the experienced people meet on Tuesdays and Fridays. The same material is presented to each.

As always with any program that is worthy, many unforeseen and indirect advantages turned up. In the sales training programs conducted by the visual education department, not only are the sales people and store owners girding themselves for the competition ahead, but many of them have an opportunity for the first time to meet each other face to face around a table, come to know and understand each other's problems, and to respect each other's sales ability.

So successful has this program been that requests for its presentation have come from other organizations, including a building material supply house, a large ship chandler, a plumbers' association, a sales executive club.

Telling the Utility Story to Customers

TO reduce service interruptions on farms to a minimum, the visual education department is now conducting a series of farm meetings. A sample meter and switch panel are mounted on a display board. The farmers are taught how to locate trouble and restore their own service only when minor causes are the reason for outages. The talk and demonstration is concluded with the film, "Running Water," which tells a story of electricity and pumping, and describes the advantages of electric pumping on the farm.

The visual education department has proved an invaluable aid to the home service activity of the company in presenting films boosting the modern gas kitchen. The idea of the modern gas kitchen, better wiring, and home lighting have been effectively promoted in films shown before audiences of San Diego's Home Planners' Institute.

It is through the efforts of the educational department that a 35-mm. copy of the "Ready-Made Magic" film, which is equally as entertaining as it is informative, is being shown at local theaters throughout San Diego county. Because of the close cooperation that exists between the city schools and the navy, the visual education department has on occasion been able to present films of unusual interest to club meetings.

Other movies, which tell an interesting story of the history, development, and uses of gas, have been presented to luncheon clubs, business groups, and farm organizations. Over the course of one year, the 27 movies now in the company's library have been presented for a total of 236 showings before a combined audience of 10,815 people.

The amount of good accomplished by this public relations program cannot be measured in figures, but by a better understanding on the part of the public in the years to come of utility problems and a public recognition of a great industry.

Safety Briefs

PAINTING PIPE

1. Wear goggles or face shields when pouring or carrying primer or hot dope.
2. Wear good shoes, leggings and gloves when carrying and pouring hot dope.
3. When carrying hot dope do not overload bucket; walk carefully to avoid splashing.
4. When carrying or pouring hot dope or primer, button shirt and collar, and roll down and button sleeves.
5. When lighting the fire under dope kettle, use a long handled torch soaked in kerosene, then stand to one side to avoid a possible flash from combustion chamber.
6. Use crimped or welded carrying buckets; never use a bucket with soldered seams.

From The Southern Natural Gas Co., Birmingham, Ala.

Double Play

UTILITY TO BUTANE DEALER TO UTILITY AGAIN — PATTERN FOR RESERVING CUSTOMERS BEYOND MAINS

FOR skirmishes beyond the mains in Southern California, gas utilities are establishing outposts to hold the line against electric competition. Allies in the form of liquefied petroleum gas dealers will supplement the expansion of gas companies with a definite plan of action. And under the strategy adopted by the sales forces of the Southern California Gas Co. and the Southern Counties Gas Co., cooperation is the keynote—to the victor will belong a substantial assured load for the future.

Exclusive

To combat electricity's campaign for "sewing up" builders in the fringe areas, C. D. Aseltine, general supervisor of main extensions for Southern California Gas Co., and F. S. Parmenter, assistant manager of appliance sales for Southern Counties Gas Co., have drawn up independent programs designed to help establish LP-Gas dealers in areas where the utilities might want to operate in the future. The twin companies, which control most of natural gas distribution between San Diego and Fresno, will do more than promote the use of butane and propane in new housing units. They will solicit use of the fuels in existing dwellings as well.

This blitzkrieg on electrical competition, of course, will be of benefit to all concerned. The utilities gain by encouraging the future use of gas. It is also to their advantage to win the cooperation of LP-Gas dealers, who are capable of weaning consumers away from the power lines.

Prospects who make personal appearances at the gas company offices will be directed to LP-Gas dealers, no matter how far they are from the mains. Actual solicitation for use of LP-Gas will take place as far as three miles beyond present facilities, depending upon the promise of future development for the gas companies.

A committee of Southern California LP-Gas dealers comprised of Chairman E. Ernest Adams, also state chairman of the LPGA, Robert G. Hardie, Imperial Gas Co., Los Angeles, and Jack Reynard, Propane Gas Service Co., San Fernando, will submit a list of local operators for the gas companies to work with. Approximately 75 LP-Gas dealers are expected to participate in the program.

An outstanding feature of the undertaking is the desire of the utilities to throw their training schools open to liquefied petroleum gas sales and service men. Southern Counties Gas Co. will instruct LP-Gas men in appliance sales, and Southern California Gas Co. will offer one-week courses in both sales and installation.

The plan will take this form:

When the owner of new building is beyond the reach of utility facilities, gas salesmen will supply the prospect with an introductory card carrying the name of the nearest reliable LP-Gas dealer. According to the program, the gas utility representatives will do more than this. They will actively sell the idea of the use of liquefied petroleum gas-fueled systems to consumers. After contact has been established, the sales departments of Southern Counties Gas and Southern California Gas will prepare prospect cards which will be put in the hands of LP-Gas dealers. It is up to them to complete the sales, but gas utility dealer representatives will keep in touch with them to see what success they have and to offer additional assistance.

Under the arrangement the advance of gas companies into new territories denied them by financial considerations in the past will be strengthened by a new method of gaining desired footholds. Butane and propane-fueled systems can preserve the new construction load for gas use until mains are extended. The cash deposit usually necessary to reach prospects in thinly populated fringe areas, the economic obstacle most often responsible for letting business get away to electric competition, will no longer frighten

Southern California and Southern Counties Gas Co.'s are building for the future by invading the "fringe." By actively promoting sales, leading these sales to the LP-Gas dealer's doorstep, and assisting the dealer in every way possible ("every way possible" is detailed herein) to clinch the sale, they are reserving a promising load for that future date when extension of the mains will be economically advantageous.

off prospects.

In the future, a typical sales approach by utility salesmen to prospective gas consumers in the fringe areas might be like this:

"You live too far beyond our mains to enable us to serve you economically now. A main extension to your property would require a refundable cash deposit."

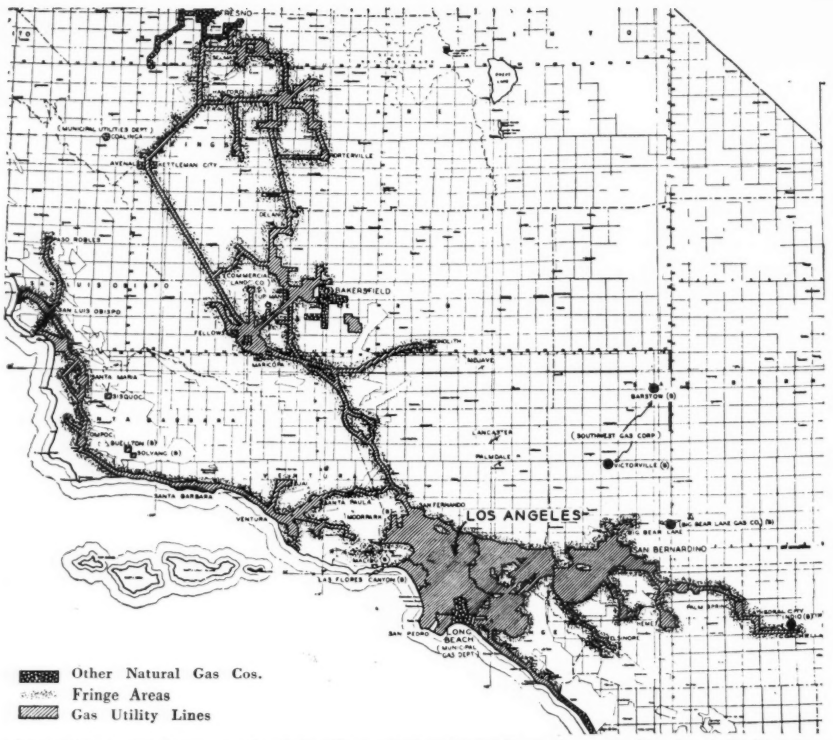
"Then," the prospect says, "I suppose I will have to use electricity in order to have city conveniences."

"No, indeed," the gas man may answer. "We have a method of supplying gas to your appliances until you acquire enough neighbors for us to make an economical extension of our facilities."

He has an ace up his sleeve—another fuel to offer (LP-Gas) that will do the heating, cooking, and refrigeration jobs beyond the mains more economically, more thoroughly, and more quickly than electricity.

"How about installing an LP-Gas system in your home?" he can say. He will proceed to explain the advantages of the fuel. At the close of the interview, he will give the prospect a card introducing the nearest liquefied petroleum gas dealer. Thus are the opening shots in the battle with electric competition in the fringe areas fired. The prospect cards which are delivered to LP-Gas dealers by the gas utility sales departments assure them of hitting the target.

As interpreted by Mr. Parmenter of Southern Counties, the company's statement of policy amounts to active, exclusive solicitation for dealer accounts of the sale of gas appliances in dwelling units under construction beyond reach of, but near to, the present gas company facilities. LP-Gas dealers will be included among the utility's certified "Blue Flame" dealers, which



Map shows territory serviced by lines of Southern Counties and Southern California Gas Companies.

permits them to use the seal and take advantage of Southern Counties advertising.

Service Stressed

Under the company's program, the quality of service rendered after appliances have been installed, as well as keeping customers gas-minded with butane and propane, will be emphasized. Although preventing a line of fringe area prospects from being punctuated by exclusively electricity users is the objective, the gas companies want to assure efficient, dependable service to their "customers-by-proxy." Southern California Gas Co.'s educational program, under the direction of R. C. Terradell, service, and Paul Speers, sales, will instruct LP-Gas dealers on the subject.

Southern Counties has a sales force of 21 men who devote their time to arranging for delivery of natural gas to consumers. These will be the salesmen who will supply tips on new business to liquefied petroleum gas dispensers. Only butane and propane men who sell gas appliances exclusively will be favored with information on new prospects.

At the Southern California Gas Co,. Mr. Aseltine has made up a six-point outline on the cooperative movement with LP-Gas men. It is set up in the following manner:

1. Southern California Gas Co. will furnish prospects for LP-Gas

INTRODUCTORY CARD

(To send customer to LP-Gas dealer.)

_____ 19____

To_____

_____

Introducing

_____

Who would like information regarding_____

_____

Signed: _____

Southern Counties Gas Co. of California

dealers.

2. The company will sell the idea that liquefied petroleum gas is not a mystery fuel.

3. The company will talk up "CP" gas appliances with the idea of converting prospects to natural gas later.

4. An educational program, already in operation in some districts, will be extended to include all LP-Gas dealers.

5. The company's dealer contact representatives will call on LP-Gas dealers to keep them up to date on developments.

6. Maps showing territory covered by the mains will be issued to LP-Gas dealers.

In turn, The Southern California Gas Co. has set up these requirements for liquefied petroleum gas men:

1. They must be reliable, fully-insured distributors.

2. They must be willing to serve consumers with LP-Gas on short-time basis.

3. They should render a similar type of service, i.e., appliance adjustments and maintenance.

Southern California Gas fields 100 representatives who devote their time to corralling new gas consumers in the fringe areas. Prospect cards identical to those used by Southern Counties will be filtered through sales supervisors before going to LP-Gas dealers.

Southern California will also allow liquefied petroleum gas appliance dealers to use its "Blue Seal," the equivalent of Southern Counties' "Blue Flame" certification. Under the "Blue Seal Plan," LP-Gas dealers qualify for the benefits of an 11-point dealers' co-operation program. The special benefits:

1. *Sales.* The gas company is continuing to make sales in the postwar period, but these sales fall into two categories—undeclared sales and declared sales. An undeclared sale is a sale made by a gas company representative to an indvidual who does not mention the name of a gas appliance dealer. In this event, the sale is turned over to the neighborhood "Blue Seal" dealer. If the dealer completes the sale and installs the appliance, the company makes a small selling charge. A declared sale is a sale made by a gas company representative to a purchaser who names a specific dealer. This sale goes to that dealer—either a "Blue Seal" dealer or a cooperative dealer.

2. *Prospects.* The same general plan is followed with respect to prospects. In other words, the names of "undeclared" prospective purchasers who do not complete sales with a gas company representative are turned over to the "Blue Seal" dealer in the prospective purchaser's neighborhood. Like sales, only prospects specifically declared for a cooperative dealer will go to him.

3. *Advertising.* The "Blue Seal" will tie into gas company advertising, advertising that will direct customers to the dealer. Also, the gas company will participate in a greater share of the dealer's authorized advertising costs during special sales campaigns.

4. *Direct Mail.* Special mailing and call lists will be made available; special assistance will be given with direct mail literature.

5. *Cooking Schools.* Direct tie-in and participation in local cooking schools will be held in the dealer's store where space and traffic justify.

6. *Sales Promotion.* Sales literature, bulletins, truck and counter cards, banners, and other promotional pieces will be made available.

7. *Window Display.* Special help will be available for solving window and store display problems. The dealer's name will be in a prominent list of "Blue Seal" dealers displayed in the local gas company offices.

8. *The Blue Seal.* Only a "Blue Seal" dealer will be allowed to display and receive the special benefits of the copyrighted "Blue Seal." It may be displayed on windows; in the store, on trucks; on mailing pieces; and in advertising. "Blue Seal" dealers will be eligible for special listing in the classified section of local telephone directories.

9. *Financing Plan.* Favorable financing plans will be available by several financing agencies for the dealer's gas appliance sales.

10. *Sales Training.* Free, interesting courses by experienced instructors will be available to both "Blue Seal" and cooperative dealer sales personnel, directed to making more sales and to reducing selling costs.

11. *Continuous Help.* Specialized gas company representatives and sales counselors will be ready at all times to help the dealer with his gas appliance merchandising problems.

This is an undertaking, then, that will assume proportions far beyond the sniping operations that have harassed electrical expansion in the past. It is a full-scale program designed to marshall the mutually interested forces of gas utilities and LP-Gas industries. No matter what form it is in, "Gas Has Got It," and it's out to get the business in Southern California fringe areas.

LP-GAS PROSPECT

Prospect's Name_____ Phone_____

Address_____ City_____

Prospect Wants_____ Appl._____ Make_____ Model_____

Call on_____ Phone_____ Date_____ Time_____

Prospect has shown dealer preference. Yes_____ No_____

Prospect given to_____ Phone_____

Address_____ City_____

Introductory card given prospect. Yes_____ No_____

Submitted by

Southern Counties Gas Co.

Omaha Is Converting To Natural Gas

STUDENT ENGINEERS HANDLE CHANGEOVER OF 182,000 GAS APPLIANCES

Bill Kirk, loaned to Metrolpolitan Utilities District by Servel, prepares a group of student engineers for their huge conversion job by giving instruction on changing over a refrigerator for operation on natural gas.

By S. S. CALDWELL
Metropolitan Utilities District
Omaha, Nebr.

OMAHA, Nebr., is in the midst of converting from manufactured to natural gas. This changeover involves 60,862 gas customers and over 182,586 gas appliances.

In charge of plans for the changeover were Burgess Manchester, Metropolitan Utilities District gas engineer, and his assistant, Charles F. Holdrege.

Tests were started a year ago in a laboratory set up for that purpose. V. C. Dworak, training supervisor, was sent to the training school of the Washington Gas Light Co. for a preview of their plans for conversion. Frank Reynolds, in charge of laboratories and assistant training supervisor, made a study of the Keokuk conversion. General Manager Walter S. Byrne visited Rockford, St. Louis and Chicago, where various gas appliance manufacturers were contacted. Information gleaned from these trips was incorporated in laboratory studies.

It was decided that the sectionalizing method was best adapted to the convenience of Omaha gas consumers.

A study was made by service men of over 10,000 different gas appliances in Omaha. The purchasing department ordered more than 750,000 parts to supply the different appliances.

Personnel Selection

The Personnel department decided to use veterans finishing their college courses in engineering and scientific schools for the physical job of converting, feeling that they were accustomed to study and had mechanical aptitude. Circulars were sent in February to all colleges in the vicinity that offered scientific and engineering courses. They were posted on college bulletin boards and disseminated through the placement bureaus. The pay scale was set at $1 per hour.

In May, out of 1200 applications, 300 students were selected for intensive training. By picking only those whose families lived in Omaha, a housing problem was obviated. The start of the changeover was June 9 and the planned termination Sept. 15. This enabled the students to start work when the summer term closed and have the job complete before their colleges opened in the fall. Representatives from 19 colleges and universities are working on the job.

The next question was that of student training for the changeover. The personnel department selected 41 teachers of science and mechanical arts from Omaha high schools. They were given in their spare time 80 hours of intensive training by V. C. Dworak, Frank Reynolds and W. T. Burgess, assistant training supervisor. They were in fact teachers to train the teachers, who were to train the college students.

The first group of 180 students was processed by the personnel department May 31 and given a week of intensive training by the changeover staff and the high school teachers. On June 9 the first group of college students started on conversion work. Each high school teacher was assigned a squad of seven or eight students, so that the men could follow theory with practice. The second group of 120 students, who had a later summer term, were out on the job June 16, their week of training starting June 9.

Conversion Procedure

Each member of the crew is provided with a complete tool kit. These kits are stored in a tool wagon, which is stationed on the outskirts of the section the crews are to enter. By 8 a.m. the crews are ready to start on their day's work. Every morning the crew leader issues to each member of his crew a list of three or four houses he is expected to visit and change over. He is also given the name of the tenant so he can knock at the back door and call him by name. The crew man has previously visited each house, checked the appliances, and arranged with the tenant the most convenient time that day to make the changeover.

The city is divided into 75 sections. R. H. Lawlor, who had a number of years' experience in gas conversion, is field director.

Between 300 and 400 men were assigned to each section on the day of the changeover. Three hundred conversion students comprising 43 crews do the actual conversion work; backing up these crews are about 50 trained mechanics, some of them recruited from all over the country, who have been doing changeover work for years. The balance are selected from our skilled mechanics in the service department.

These crews are handled by three foremen, who take all trouble calls and have a force on hand to give prompt service. There are separate crews that convert gas furnaces and all industrial and commercial appliances.

The conversion to date has progressed with clock-like precision. Four hundred and fifty-eight shutoff valves were installed during the winter and spring months when the weather permitted, so that natural gas could be turned on and manufactured gas valved off in any section when the changeover crew wished to enter.

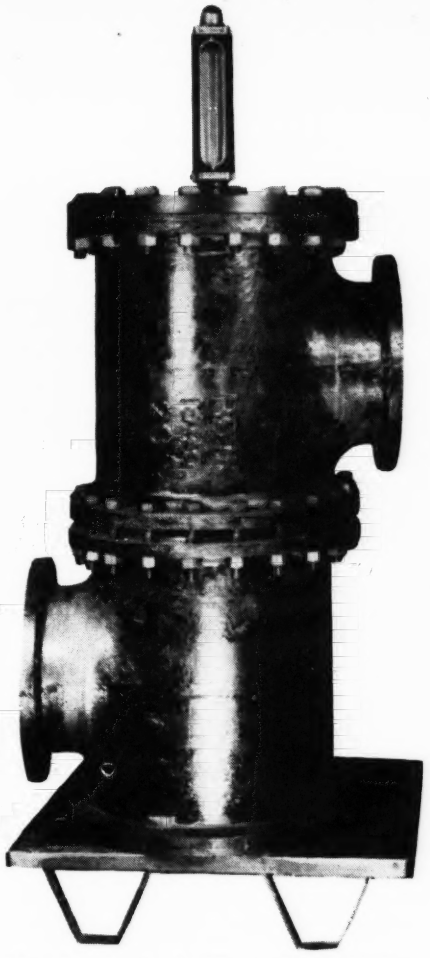
The student mechanics have made a great hit in Omaha with the public. They rapidly became skilled in conversion technique and have developed into ambassadors of good will for the Metropolitan Utilities District.

Variable Area Meters

In The Gas Measurement Field

By HARVEY KROUSE

Divisional Field Engineer
Fischer & Porter Co.



The Rotasleeve, the Flowrator design that has the most application in the gas measurement field. Installed on a 20-in. pipe, it is equipped with an indicating extension. Referred to in the text as Fig. 6.

The term "Flowrator" has been adopted by the Fischer & Porter Co. to define more clearly the design of flow measuring instruments commonly known as Rotameters. The word Flowrator will be used in the article where applicable.

Although the Flowrator has attained in a few years a position of importance in many of the process industries, it is a relatively new instrument to the gas industry.

THE Flowrator is a variable area type meter. A movable body known as the "float" is arranged for vertical motion within and concentric with the axis of a precision-bore tapered metering tube. A slight but constant back pressure against flow is produced by the weight of the float, and any fluid pressure at the inlet in excess of this weight will cause the float to rise until the increasing area between the float head diameter and the inside diameter of the metering tube becomes sufficient to permit the quantity of fluid flowing through the meter to pass. Under these conditions, the float weight is in equilibrium with the upward forces of flow and its position is an accurate indication of the rate of flow.

Any increase in flow rate causes the float to rise higher in the tube; any decrease causes it to sink to a lower level. Every float position corresponds to one flow rate and no other. In the indicating Flowrator, it is merely necessary to engrave a reading, or calibration scale, on the outside of the Pyrex glass tube and the flow rate can be instantaneously and directly determined by observing the position of the metering float.

Now let us examine briefly the basic flow formula, $Q = AC\sqrt{2gh}$, for flow rate meters containing some sort of fluid obstruction, and compare the differences between the Rotameter principle and that of the orifice, or Venturi, meter.

The Flowrator determines flow rate by measuring the area around the obstruction (designated as "A" in the equation). This is unlike the orifice meter, which measures the head loss across the obstruction (designated as "h" in the equation). In the first case, the factor "A" is out from under the square root radical and this varies directly with the flow rate; while in the differential pressure type meter, the flow rate varies as the square root of the "h" factor, or head loss.

Plotting of flow rates would show Flowrator's linear calibration curves and equal scale spacings. This condition permits equal-scale fraction accuracy over the full flow range and affords a wide range of 10 to 1.20 to 1, or greater if so desired. Another basic fact should be noted. Since the downward forces in the Flowrator measurement are equal to the weight of the float less the displaced fluid, the pressure loss across the float head remains constant throughout any part of the flow range. The constant head loss is extremely low, its value may be as small as 1 in. water column for some gaseous flows.

Although the viscosity of fluids is not a factor that particularly concerns those in the gas measuring field, we do want to touch upon the automatic compensation for viscosity variations that is afforded by the Flowrator. Explaining this feature, we want to accentuate that turbulence of flow has no effect on the fidelity of Flowrator measurement. Observe in *Fig. 1* that the flow pattern in the top two illustrations is relatively laminar, which subjects this type of plumb bob float to surface drag where the fluid viscosity is of any significance. Under these conditions, vertical position of this float is dictated by two variables, namely: velocity and viscous drag.

In order to eliminate automatically the effects of viscosity and provide for an indication of the true velocity or flow rate, we have designed a float similar in shape to the two lower diagrams shown in this illustration. This float, which we have called the Stabl-Vis float, is umbrella shaped with sharp approach edges. Such a design creates considerable turbulence around the float head as shown, eliminating surface drag and permitting the float to assume its position in the metering tube in response to the velocity alone.

In *Fig. 2* is shown the effect of float shapes on the Flowrator flow coefficients. When measuring with the plumb bob float, there are individual flow coefficients for water and oil at two temperatures. With the Stabl-Vis float, the coefficients for the same flows are identical, and thus automatic compensation for viscosity changes is accomplished.

The discussion on this important feature has been abridged, but we have given the essentials in order to show that we purposely induce turbulent flow through the Flowrator. The significance of the fact that turbulence does not adversely affect the accuracy of the Flowrator should immediately be apparent. It is unnecessary to establish long lengths of straight pipe before and after the meter in order to create laminar flow. The installation of the Flowrator can be made in a considerably reduced space with fittings and valves placed as close to the meter as piping will permit.

THE first instrument of this type was patented in the United States in 1858 by Chameroy, of France, and to the best of our knowledge, this was the original Rotameter. The tapered metering tube was made of metal and the flow indication was provided through packing glands, cables, pulleys, gear trains, and a dial type indi-

eator. There is no evidence that any of these instruments were ever built, and it is small wonder when we view it in the light of present standards.

Several subsequent attempts were made to develop a meter of this type, but it remained for Karl Kruppers to obtain a United States patent in 1910 on this design. (See *Fig. 3.*) Here is a free float traveling vertically in a tapered glass tube. In this design, Krupper cut slots in the float head to impart rotation to the float to throw off dirt and indicate freedom of motion. Thus the word Rotameter came into use to identify tapered tube flow rate meters with rotating floats. (With the advent of the beaded metering tube, which affords three-point guidance, the need for rotating floats has been eliminated and accordingly the word Rotameter is now a misnomer, and has thus given way to the word Flowrator).

Although scarcely two dozen of Krupper's instruments were brought into the United States throughout the next decade, the Rotameter did begin to get a little recognition. Rotameters began to be manufactured in the United States in 1931 when the development of the carbon mandrel process made it possible to produce a low cost, heavy-walled, tapered tube with reasonably uniform taper and wall thickness. These were fairly satisfactory instruments and the growth of continuous processing methods in industry created a demand for Rotameters, although it was necessary to calibrate them individually.

In 1936 the Fischer & Porter Co. was formed and developed the process for producing precision bored, tapered glass tubes to tolerances as low as a few ten thousandths. Such precision made the metering tubes interchangeable in the field, and factory calibration was no longer necessary.

In *Fig. 4* is shown an instrument which is called the Master Enclosed Flowrator. In this design, the top and bottom end fittings are securely held together by the removable side plates. This rigid construction absorbs all the line strains when the meter is installed in the piping system and at the same time forms a protective enclosure around the metering elements. The openings front and back for viewing the float and flow scale are made of laminated safety glass. The Master Enclosed Meter is made with both screwed and flanged connections and the metal parts can be fabricated of any materials that can be machined or cast, to provide for corrosion resistance. Pipe sizes are available from ¼-in. to 4-in.

The limitation on the use of this design is the internal pressure to which Pyrex tubes are subject. The smallest size can withstand pressures up to 500 lb. while the largest, the 4-in., is limited to about 60 lb.

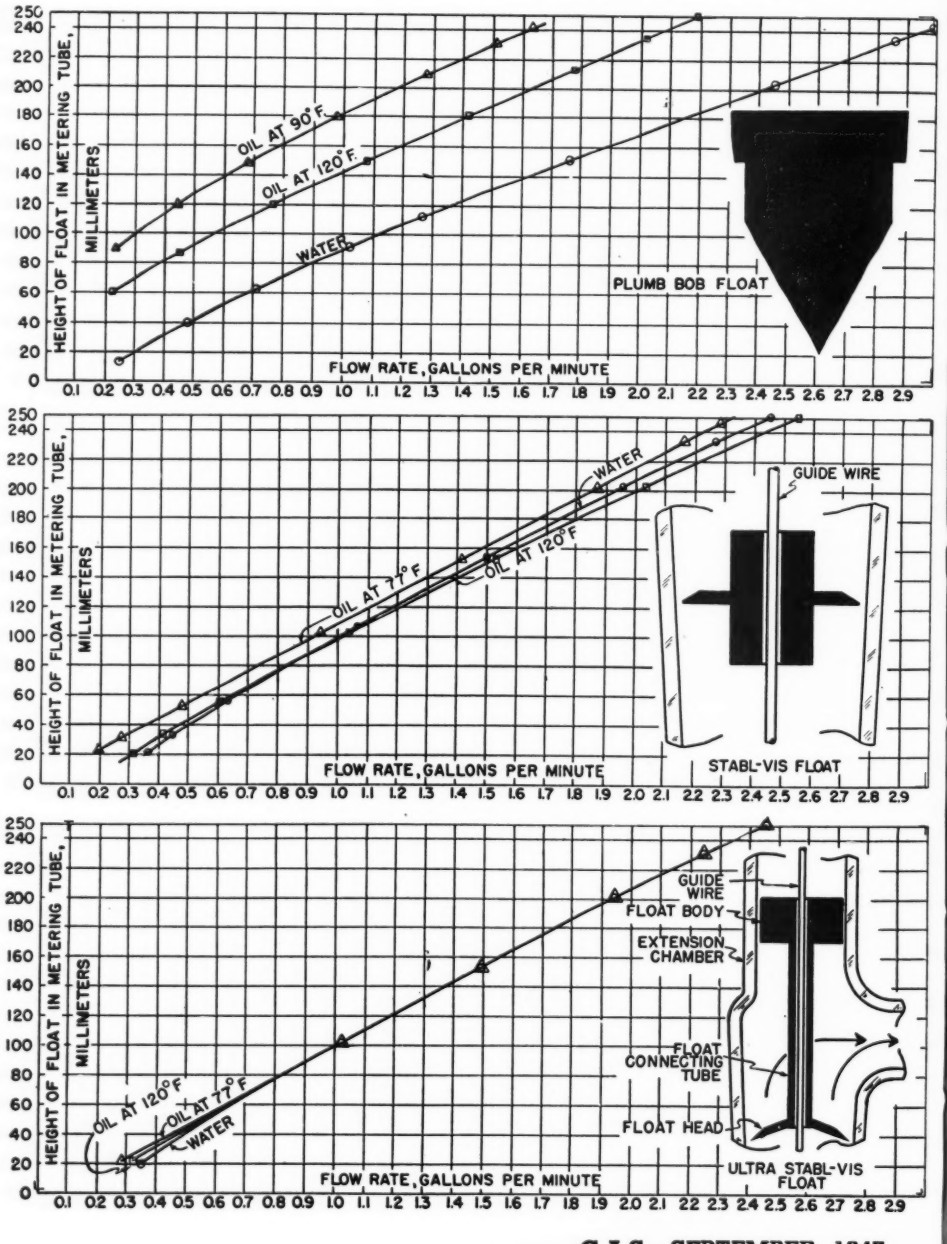
For the handling of services where excessive line pressures or temperatures are involved, we fully enclose the metering tube in a metal body balancing the pressure on either side of the tube. This design is shown in *Fig. 5*, and is known as the Armored Valve Body Flowrator. Pressures up to 7500 lb. can be withstood by this construction, depending upon the body and fittings provided. A Pyrex glass or metallic metering tube may be inserted in the "latern" of the Valve Body Meter.

Note that the float positions are observed in a high pressure gauge glass extension either above or below the meter body. There are no stuffing boxes in this construction; the fluid fills the indicating extension and the float rides freely in equilibrium in the fluid being measured. The flow scale is etched on the indicator glass. The valve body is made in pipe sizes from ¾-in. to 5-in.

Now we come to the meter design that has the most application in the gas measurement field—the Rotosleeve (see *Fig. 6.*) It is made from 3-in. to 20-in. pipe sizes handling up to a maximum of 16,000 cfm of air when metered at standard temperature and pressure. This illustration shows the 20-in. size equipped with an indicating extension.

Observe that the metering elements —the metal metering tube, the float and the indicating head—are assembled within standard pipe tees. This

Fig. 1. Effect of float shapes on flow coefficient C.

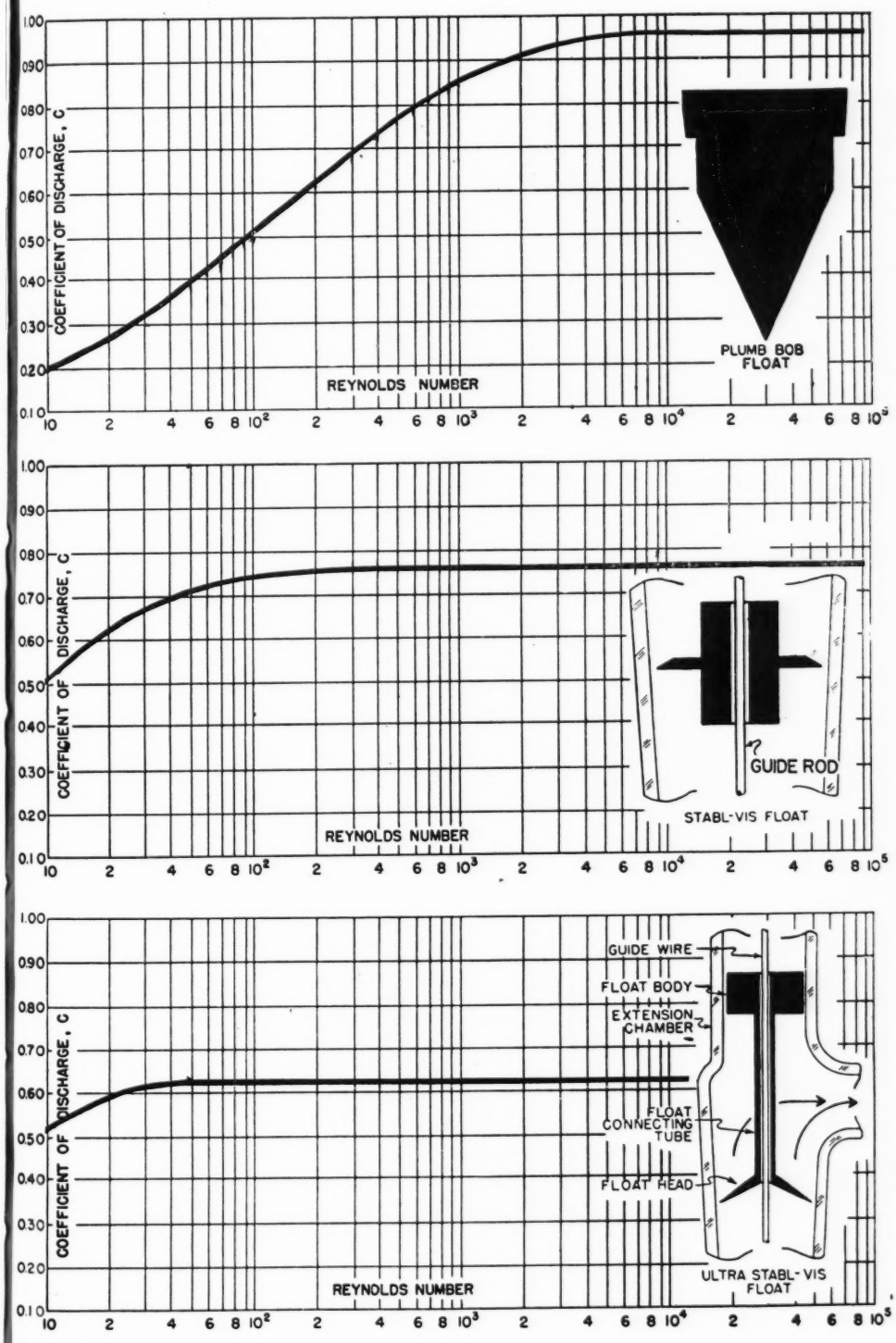


arrangement permits the most compact installation and space saving as well as eliminating the cost of any special body casting for these larger meters. Since the precision-bore metering tube is fabricated of a metal, consideration is given only to the strength of the tees employed and the indicating head for handling the line pressures involved in any installation.

So far, we have considered the Flowrator only as an indicating flow meter. Now we would like to discuss two methods by which the indicated flow rate of the metering element is transmitted to recording and totalizing units.

Fig. 7 shows what we call the "Magna-Bond Transmission" where the secondary instrument is an integral part of the metering element. The float is provided with an extension which is enclosed by the stainless steel tube as shown. Note again that the fluid is free to fill this tube so that the movement of the float is almost frictionless. Embedded in the float extension is a permanent "Alnico" magnet with its polarity arranged to have south poles at the extremes and the north poles in the center. Exernally located and entirely disconnected mechanically is a second U-shaped magnet on the end of a balance arm. The poles of this magnet are oppositely arranged so that there is a complete magnetic bond between the following arm and the float extension. Because of the polarity arrangement, this magnetic bond cannot be broken by any sudden surge of the fluid being measured. By suitable linkage to the balance arm, a continuous chart record of this instantaneous flow rate is provided.

Fig. 2. Effect of float shape on differences in Flowrator calibrations when fluids of different viscosities are measured.



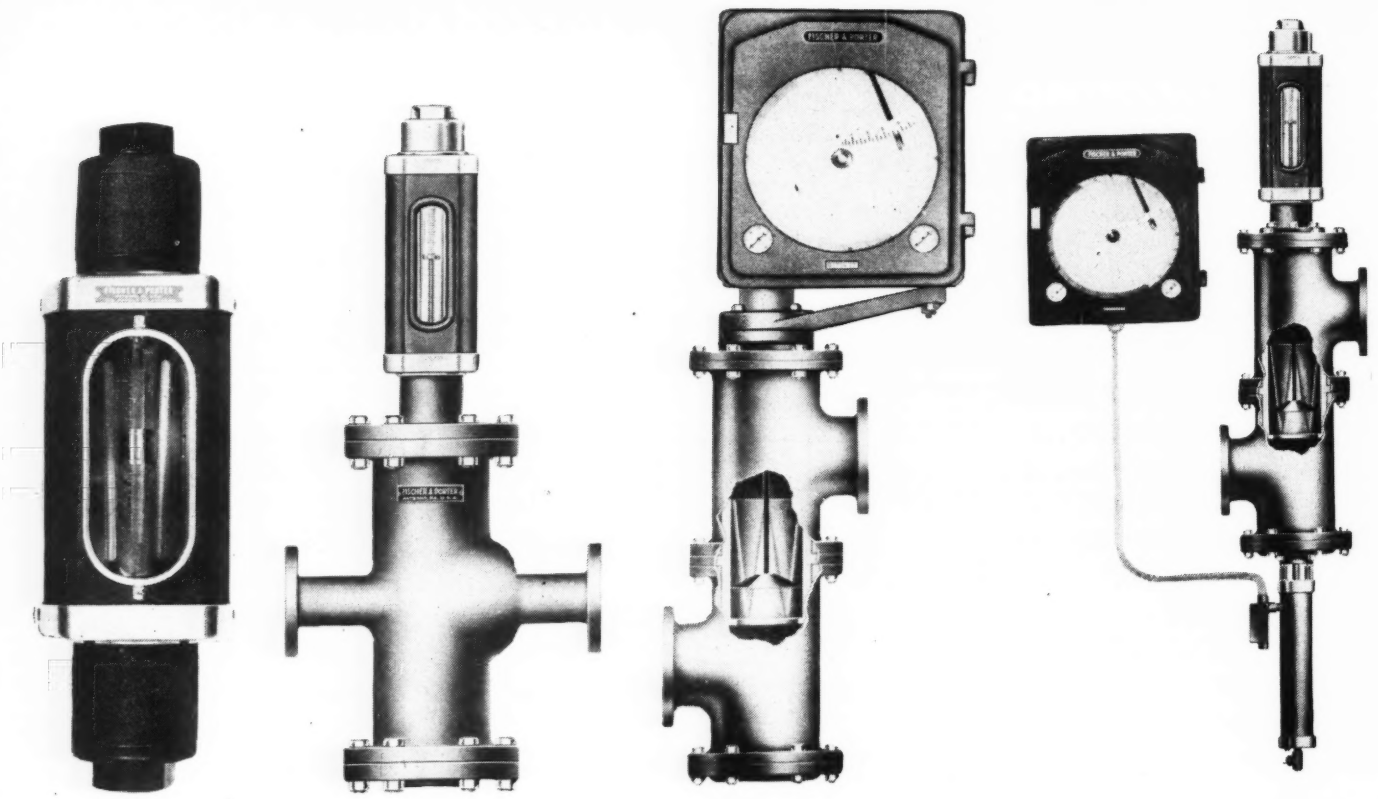
It is obvious that the Magna-Bond instrument is adaptable to locations where the recording and totalizing unit is preferred at the point of measurement and especially where electric current is not available.

The electrical transmission system for telemetering the indicated flow rate to a remotely located recording unit is illustrated in *Fig. 9*. It is an induction bridge circuit in which the receiving impedence coils have been physically separated to provide for greater power at the null point. The details of the transmitting element show an extension of the metering float traveling in a tubular well located either above or below the rotameter. Again there are no packing glands to impede the free movement of the float. A soft iron armature is embedded in the float extension which, when traveling through the field of the surrounding impedence coils, electrically actuates the receiving coils and positions the balance arm. Similar functions of recording and totalizing can, of course, be obtained with this remote unit.

It is interesting to note that the float travel for both the electric transmission and the Magna-Bond is 127 millimeters, or 5 in., and that a 1:1 ratio exists between vertical float movement and the angular pen movement, since the recording section of the chart is 127 millimeters wide. This condition permits an identical reproduction in the recording instruments of the flow rate as metered by the prime element.

During this recent part of the discussion, we have concerned ourselves with instruments designed for general usage, and now we would like to consider some individual problems that may arise in measuring fuel gases.

PULSATIONS due to reciprocating compressors have always created a problem in flow measurement. When employing a Flowrator these pulsations are minimized by the inclusion of a dash pot, which consists of a piston displacing dash pot oil or water



Figs. 4, 5, 7 and 8. Various types of Flowrators. At far left is the Master Enclosed Flowrator; next is the Armored Valve Body Flowrator; then the Magna-Bond Transmission recording Flowrator; at right is the electrical transmission system for telemetering indicated gas flow rate to a remote recording point.

in a cylinder through a by-pass arrangement. The opening of the valve in the hydraulic by-pass can be adjusted to give the correct degree of pulsation dampening. It should be pointed out that the addition of the dash pot does not affect the accurate positioning of the float.

In the Ratosleeve, the dash pot is so designed that it fits compactly inside one of the enclosing pipe tees.

The question frequently arises concerning the ability of the Flowrator to handle gases in which solid particles or tarry materials are carried in suspension, such as in coke oven gas. In the Flowrator, any tendency for accumulation of foreign materials on the metering elements is eliminated by the employment of the Stabl-Vis float. As previously mentioned, this design of float creates turbulence of flow around the float head so that the liquid or solid substances are accelerated away from the surfaces of the float and tube. The clean metering elements are, as a result, continuously free to measure the dirty gas accurately.

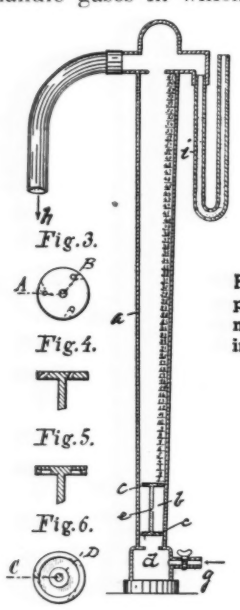


Fig. 3. Karl Kupper's U. S. rotameter, patented in 1910.

There is every reason to expect that there will be a condensation of some of the moisture carried in natural gas as it passes through the Ratosleeve. In the wintertime, this condition, if of sufficient amount, will cause ice formation in and around the metering elements which naturally will stop the movement of the float. A similar condition exists with pressure regulators and the method employed to prevent the condition is familiar. The Ratosleeve can be equipped with a like device for dripping alcohol through the metering tube and filling the lower transmitting extension so that the only moving part, the float, can be maintained in free motion to respond to flow rate changes.

Perhaps the most important outlook for the simplification of routine gas measurement functions is the ability to read directly from the recording unit the amount of gas passing through the meter in any given time; the continuous record on the chart is the actual flow rate. If no variation in line pressure is experienced, such an installation can be equipped with an integrator, and the data on accumulated flow can be taken directly from a counter dial.

Especially for gas measuring requirements, a pressure compensated recording pen gives a direct record of the true flow rate irrespective of pressure variation. Naturally, an integrator in conjunction with this pressure compensated element will be invaluable.

In summation we would like again to accentuate two of the advantages of the Flowrator that are pertinent to gas measurement—accuracy over a wide flow range, and condensed installation requirements.

In the first case, it has been shown that equal chart or scale fraction accuracies can be attained over the full flow range due to the linear calibration of the Flowrator, thus permitting a 10 to 1 or greater rangeability.

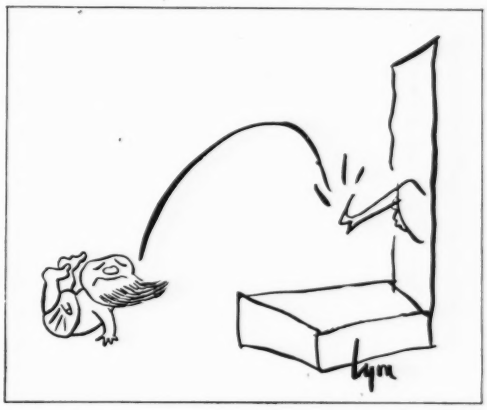
The second advantage is equally important. Turbulence has no effect on the fidelity of the measurement by Flowrator, so that it is unnecessary to include long pipe assemblies and straightening vanes to straighten out the gas flow pattern.

FREE SERVICE
Problem Child of the Industry

With service cost per customer increasing while the price of gas remains constant, Rochester Gas and Electric Corp. has revived service charges.

By SCHUYLER F. BALDWIN

Rochester (N.Y.) Gas and Electric Corp.



THERE is no doubt that free service is a problem child of the gas industry. With our company it has remained slightly above 30% of our total distribution cost since the close of the depression years in the mid 30s. And this, in spite of the fact that in the 30s we pleaded for business and were using free service as a means to that end. While now, our gross revenues are booming and we have every need to reduce our expenses. *(Fig. 1*—Gross Revenues).

Fig. 2 is a picture of our net operating revenues since 1933. And yet we have become so sales-minded, we dare not pull down this creation of ours, lest it pull down our business with it. Operating costs have been rising on an almost unbroken curve since 1933.

(Fig. 4—Total Distribution Cost). And just behind them and a big part of them, we have our gross appliance service expense. *(Fig. 5*—Gross Appliance Serivce Cost).

Why does this problem stay with us? Is it out of control?

1. Why has appliance servicing become such a problem?

(a) In the first place, the local gas company occupies a special place in the life of its community. Because of the very nature of its business, it enters into the home and industrial life in a way not even its big, younger brother, the electric utility, does. It is the dispenser of a commodity few outsiders know much about—and for that reason everyone looks to the gas company for expert advice. It's the gas company—not the range dealer, or the plumber—who is usually called. It is perhaps a tribute to our past record but it is none the less a headache.

When it comes to something wrong with the gas, the customers call us. For no matter how we develop new habits with our public and new service outlets for our appliances, there is always going to be a basic responsibility we cannot duck or delegate to anyone else. We are responsible for the gas we send out and if something is wrong with it, we are the only ones who can correct it. And no manufactured gas company has ever tried to get out from under that load.

Pressure trouble, impurities in the gas—these are problems that reveal themselves only when our customers are trying to use our product by means of some gas appliance. And while we've eliminated most of the bugaboos, we'll never get rid of all of them. Especially when the demand for gas sometimes exceeds the supply, as happened occasionally last winter.

(b) In the second place we continue to render appliance service in order to keep our customers. We have never seemed to be sure that we have sold our customers on the idea that gas is just as good as electricity, or even oil. Even in times like these when there are more people wanting our commodity than we can satisfy, we cautiously remember the depression years and fear the spread of competition lest it may take our cooking or our heating load from us.

There is, of course, some reason for our fears. Those two great manufacturing giants, General Electric and Westinghouse, have managed to create the almost universal impression that to be modern you must electrify; to be glamorous you must live electrically—cook, wash, light, and heat with electricity. And sometimes it seems as if we have been hypnotized with the rest. There is no doubt that folks are electrically minded, and with reason. Few men in town are electrical engineers, but there are few also who don't know something about it, who didn't study it in school, or tinker with it in their home workshop.

Our electric utility friends were not slow to see the commercial possibilities of their product—it lent itself ideally to the small home appliance, a business which snowballed and created with it thousands of handy-men who set up their own repair shops as an adjunct to their appliance sales outlets. The net result has been that the electric utility does not have an acute appliance service problem—the very magnitude of the sales job done was its protection. It couldn't have handled it, anyhow, and so the opportunity was perforce picked up by the electric appliance dealer or repair man.

Schuyler F. Baldwin, who explains the service policy of the Rochester Gas and Electric Corp., has been associated with the concern since 1934. He was domestic sales manager in the Canndiaga district for two years before becoming manager of the Househeating Service Division. At the present time, Baldwin is supervisor of Rochester Gas and Electric's gas distribution department.

Presented at Canadian Gas Association annual meeting, Niagara Falls, June 9-11.

(c) A third reason for the growth of our appliance service problem stems directly from this lusty younger brother of ours—electricity—at once our greatest competitor and helpmate. The growing demands for automatons has not been confined to the all-electric appliance. The gas appliance manufacturer was not slow to realize that electricity could be used to help him. The automatic gas appliance was the answer.

The change in our social and economic life played a part too. The depression years in the early thirties took their toll. The domestic servant disappeared, the young housewife did her own work which resulted in the small and cozy kitchen replacing the large one and taking on an added importance in the life of the family. The inevitable result was a streamlining of appliances and the elimination of manual operation.

It wasn't a simple answer and it created troubles of its own. One of them was that the gas serviceman had also to become familiar with electricity as well. I know we in Rochester became fully conscious of this problem when we were organizing our Air Raid Precautions Organization back in 1942. We had heard that in England they had left it to the householder to turn on his own gas when the supply was interrupted, and that in general it wasn't considered a big obstacle. But we were aghast at the possibility of a widespread service interruption in our own community. The almost universal acceptance of the automatic appliance left the whole burden for safe operation upon the constant burning pilot, and our service records seemed to indicate that large numbers of our people didn't have the least idea how to light their own appliances. I'm glad to say we never did have a chance to test the truth of our theories.

(d) Another reason for the growth of the service problem was simply because we couldn't find any convenient stopping place. You know, when you've been giving something away for a long time, it's easier to keep on—like the man holding on to the bear's tail. And the public has an insatiable appetite that is constantly whetted by each little thing we do.

I remember some 15 years ago when business was really tough, many of the west side hotels in New York went to extreme lengths to get business away from their competitors (seems unbelievable now, doesn't it?) They arranged three-day tours for a single price; they bribed porters and taxi drivers; they gave cut rates, especially on advertising due bills, where they paid for $1,000 worth of advertising with $5,000 of rooms, a commodity they had plenty of—and one of the biggest inducements they thought of was—free garage. Pay $2.50 for a room with bath and throw in the garage rent free.

It got to be quite a racket—the guest who had no car insisted on a rebate for his room. It grew to such proportions that the hotels tried to stop it. But the guests said no. And there were always some places that kept it up. It wasn't until business itself began to pick up that free garage ended and there were many who claimed that the practice never did create any new business, it just shifted it around.

It may be so with our own free service. But we've given it for so long, we've spoiled so many customers we don't know how to stop.

(e) One of the biggest factors in this consideration of appliance servicing is, of course, househeating, the fair-haired child of the gas industry. With househeating we find we are dealing with more than an appliance. We have to do with such nebulous things as "comfort." "pride of ownership," and such complexities as building structures, heating systems, and all the headaches that go with them.

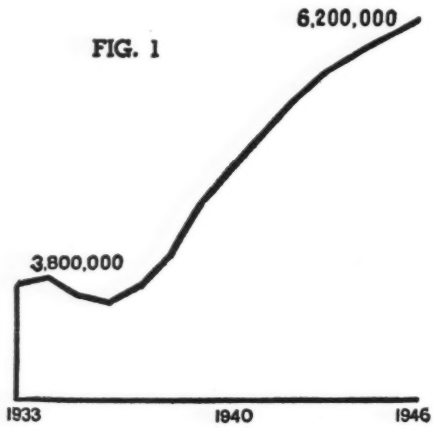
Those of us who got into the business early in the 20s had a great deal of pioneering to do. We had to buck up against the basic antagonism of operating costs, and had to justify them. There was no doubt, in the case of the manufactured gas company at least, that this matter of costs was a mighty high hurdle in the race for business. We couldn't afford to be too fussy about poorly designed heating systems or cracker-box houses. The object was to get the job in some place where someone could afford to pay for it, and let all those secondary matters come later. It was fundamentally a sales problem. Service was incidental. That is, service costs were incidental.

We had to fight the stiffest kind of oil competition, and service was the only tool we had. Once the job was in—once the customer had a chance to experience heating comfort he had never dreamed of before—we wouldn't worry. Gas heat would sell itself if it had the chance. And it was up to the service department to back up sales all the way. A faulty heat run? Correct it. A corner of the house that wouldn't get warm? Another register or cold air return. It wasn't long before some salesmen were using gas as the panacea for all heating problems.

And because service was there to take the ball from sales, we had a chance to let some of our customers see what gas heat would do.

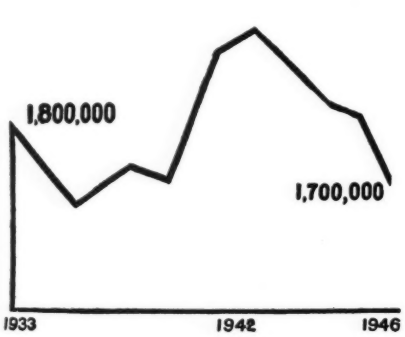
It should not be forgotten, however, that with all this free service, the customer was paying a premium rate and

FIG. 1



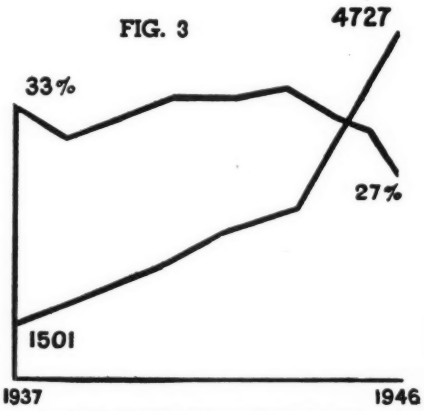
TOTAL GAS SALES REVENUE

FIG. 2



NET OPERATING REVENUE

FIG. 3



NET OPERATING REVENUE

(Actual and corrected figures to show change in purchasing value of dollar using 1923 as 100 cents.)

was using gas in houses much larger than average. In other words our annual revenue was given a double boost —high rates and high consumption, with an annual revenue per customer more than twice what it is now.

There were other service problems in those days—problems no one but the gas company could answer. Equipment had to go through a pioneering stage too. Time and again we found this unit, or that control failing as a result of faulty design. They had to be replaced; the design had to be changed; service had to take the brunt of those impacts.

Yes, it was just as much a result of service as of an intensive selling campaign that househeating was finally put upon its feet and made to walk.

But it cost money to do it. And it built up certain habit paths and formations on the part of our customers that have been distressingly hard to break. The customers aided and abetted by sales—simply took for granted the things service did for them; they felt it was thoroughly justified because of the relatively high cost they paid. And some of them didn't hesitate to play upon our fears lest we lose their business, to make unreasonable demands "or I'll go to oil."

Ah! yes—those were the days. When my lord and lady would decide to close up the house for the winter and sojourn in Florida. "Just let our service department know when you're going," said our gracious salesman, "they'll watch out for the house for you." And we did. Set the thermostat for 55°, fed the gold fish, watered the plants, and looked after the property all winter. The old time winter inspection service; daily calls in the real cold weather, two or three times a week when it was milder. Was there ever such luxury?

Nor was that all. We were taking no chances with failure of equipment. We had inspections four times a year, even once a month in some cases. We power-cleaned all furnaces and burners with heavy industrial vacuum equipment. We even had the thought during one stage of our education, that frequent inspections would anticipate complaints, forgetting in our naivete that frequent calls on our part kept our customers gas-heat conscious and on the alert for the first sign of something they could call trouble.

Is it any wonder our costs grew? As a matter of fact, in the early days we weren't too concerned about them. We were sales minded exclusively. But the piper had to be paid. He piped his tune and we danced to it—and a day of reckoning had to come. We had succeeded in our aim. We had a rate and we had an increasing business, and that imp of perverse, customer unit cost, kept bobbing up. We hit a high during the middle 30s of $50 per househeating customer per year for service alone.

So then we had to tackle the problem the hard way. Because it isn't easy to take something away when you've accustomed the patient to the diet. Yes, we must think of the gas househeating business as one of the primary reasons for our service problem.

(f) Basically the real reason for our concern with appliance servicing is no more than simple arithmetic. For the past 10 years costs of living have been rising until right now our dollar, in proportion to what it was worth in the depression years, has shrunk in value by 57%. The cost of everything has gone up, except the one thing we are in business to sell—GAS. Service cost per customer is more than twice what it was, while revenue has gone up less than one-third. Small wonder, then, that we're worried about the outlook. *(Fig. 6.)*

And so we have our problem and we have our reasons for it. They spring from:

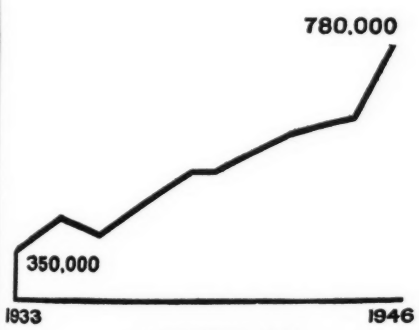
1. **The very nature of the business.**
2. **The desire to keep our customers.**
3. **The development of the automatic appliance.**
4. **Our inability to call a halt.**
5. **The development of gas househeating.**
6. **A fixed rate of return opposed to a rising cost of doing business.**

What can we do about it? Certainly the situation cries for action. Look at the curve of customer unit cost for service (see *Fig. 7*). Cost per customer has more than doubled while we were adding some 24,000 customers to our lines during the past 13 years. And now is the time to do something about it, when there is a steadily growing demand for our product; when we don't have to depend quite so much on service to bolster customer acceptance.

In the first place we feel it is imperative that we develop a definite charge for service program. The only way to reduce free service is to cut it out. One look at our record since 1938 and you will see the kind of problem we're facing *(Fig. 8*—Revenue from appliance servicing less than 10% of total service costs.) But it's easier to decide upon the elimination of some free service items than it is to carry it out. We didn't want to upset any apple carts of good will so we didn't broadcast the new policy.

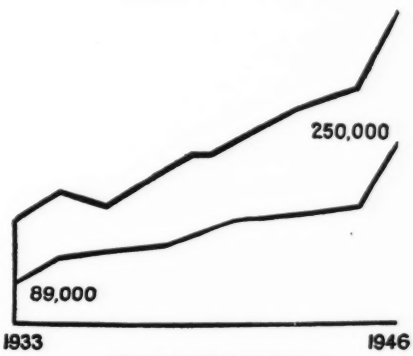
1. First of all we tried to determine what a fair policy would be, and came to the conclusion that we would charge for all service except that caused by trouble with the gas, or in the case of new equipment within a 12-month guaranteed period. Our initial objec-

FIG. 4



DISTRIBUTION OPERATING COSTS

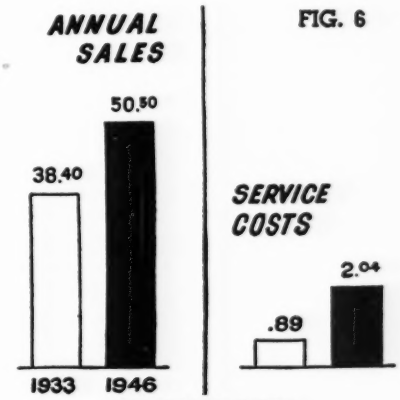
FIG. 5



APPLIANCE SERVICE COSTS

(Imposed on distribution cost curve.)

FIG. 6



CUSTOMER UNIT STATISTICS

tive was $50,000 per year—two and a half times our present return. We did use our telephone order board as a means of letting our customers know of our change in policy.

We came up against a number of problems, not all of them anticipated: Should we charge for leaks? What

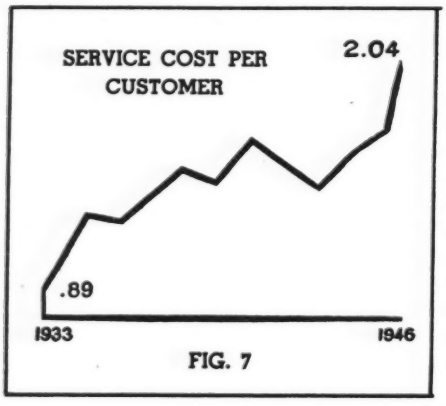


FIG. 7

about travel time? Supposing we get to the customer's house only to find that it's not our trouble—that it should never have been given to us in the first place? So we decided that in the interests of safety we'd not charge for leaks; that we would charge up to 30 minutes for travel time; that we'd not charge a customer where we didn't do any work. Yes, we had to do some back tracking, but we're convinced of two things:

1. **That our objective is worthwhile: and**
2. **That it's a job for the long pull.**

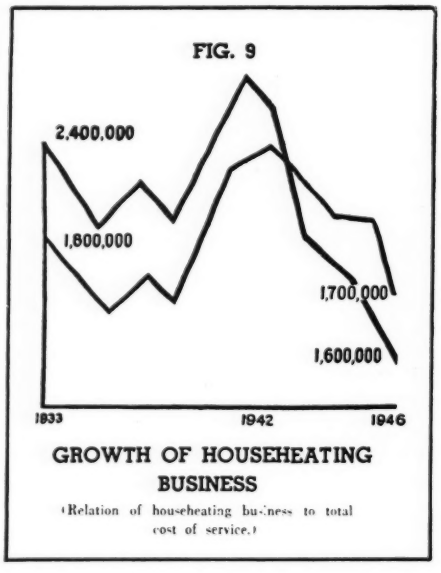
We are at least making a start—our projected income to date for the year isn't yet $50,000, but it is $38,000, and we're just getting under way.

2. We feel we must take active steps to bring about a live wire plumber-dealer cooperative relationship. Of course, we always did have such a tie-in to some extent. They took care of all of our installations for us. But until we went out of the giving of unlimited free service, they didn't have much of a chance at that business. And right now they aren't too anxious for it either. But with changing economic conditions and a desire on our part to throw business their way, we hope that we can develop a strong ally.

It has been done elsewhere, and we are convinced it is a worthwhile venture. The plumber-dealer is the only individual that is equipped to take over a good deal of our own servicing—the department store and appliance specialty shop are so far not set up to handle gas appliance service and have shown little interest in it.

3. We must not forget the important part appliances themselves play in this program of servicing. We are faced with an ever-increasing pressure on the part of the electric industry which presents a challenge we must be able to answer. We must not only encourage the gas industry to improve the design and practicability of the new gas appliance as compared with the old, but we must also be willing to take advantage of the techniques our electric cousins have used in their own equipment.

The trend from manual operation of gas controls to automatic was inevitable. We can't ignore it or change its reality by hiding our heads in the sand. It is here—created in large measure by the very same advertising of electricity as the glamour boy of the age. We might better recognize it and use it to our advantage. One of the fundamental advantages the electric appliance had over the old-fashioned gas appliance was its instant lighting.



For those of us in the manufacturing gas business to ignore that and to think we can persuade our customers that the constant burning pilot is just as good, is a snare and a delusion. Automatic electric ignition is the real answer and the sooner we get behind it the better.

It may seem to some of you that this emphasis on automatic electric ignition is going to add to our troubles instead of decreasing them. By the same token we would be going in the right direction if we were to put our whole support in back of the old-fashioned manually controlled appliance. There is no doubt that that kind of equipment presents fewer problems and is much simpler to service than the automatic appliance. And yet we know such a move is impossible. The public is sold on automatic operation and we feel that if we want to keep our business and increase it, we must provide equipment that will do a better job than its electric competitor.

Automatic electric ignition will add to our service problems while it is in the development stage. But the more active support it gets from the utility the sooner it will get its wrinkles ironed out. And when that point is reached, we believe it will contribute to a lowered cost of operation with fewer service calls. This business of battering our way through the breakers is tough going, but it is always a prerequisite to smooth sailing later.

The job our manufacturers have to do in the development of superior products is made much easier and can be done much faster if they have the concerted help of the utilities. Automatic electric ignition is just part of it. We haven't reached the ultimate in any of the four major household appliances; the CP range, the quality water heater, the gas refrigerator, and householding equipment.

4. We believe an intensive householding sales campaign will help to solve our appliance service problem. I must admit this seems to contradict the statement that householding was one of the reasons for the problem in the first place. And yet when you consider the facts you will see, I believe, that the two statements are not in opposition to one another. Householding helped to create the problem because it let us into new fields of activity—because in order to obtain this load we had to overcome the stiffest kind of customer resistance. But now that acceptance has been achieved, the job of keeping pace with it is not so great. The initial energy expended to overcome the inertia of a stationary body is often only a fraction of what it takes to keep it rolling.

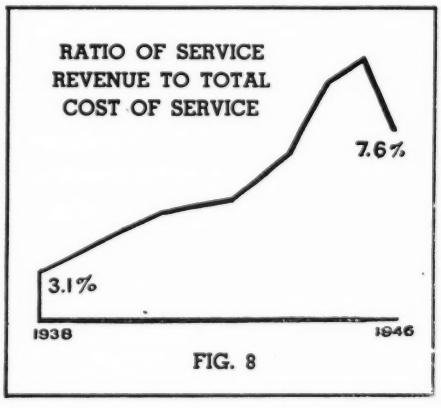


FIG. 8

Let's look at one of these curves: the percentage of total servicing cost for which householding service is responsible *(Fig. 9.)* Over a 10-year period the ratio remained almost constant although the number of jobs was doubled. And when we include 1946 we have three times the jobs with a

smaller ratio. We are discovering the fact that as we increase our saturation, we are in contact with a different kind of customer. Whereas we were formerly dealing with folks who had large houses, high incomes, and correspondingly high standards of comfort, we are now having to do with people who live in small homes, have moderate incomes, and reasonable standards of comfort. They do not expect the installation of gas heat to correct any inherent faults in the heating system, nor do they expect an abnormal amount of service.

The net result is that we can handle more customers with fewer men and have fewer complaints. In other words, we feel that we have gone through a select market group into what more nearly approximates a mass market and are finding as a result that our unit costs are going down.

5. And finally, if we are to arrive at a satisfactory solution to our problem, we must see to it that our servicemen have the benefit of an active organized appliance training program.

Our methods in the past have been reasonably satisfactory, but they do not meet present standards. The experience of other companies, such as Brooklyn Union, People's Gas of Chicago, and Minneapolis Gas Light have convinced us that the old style apprentice training program is obsolete. So many kinds of automatic equipment are coming on the market that it is almost impossible for any one man to be familiar with each one. It is not enough for the serviceman to know what particular gadget must be adjusted to remedy some trouble. He must also be able to diagnose the trouble even though he may never have seen that particular type of heater before.

The fact that we are now charging for work we formerly did free is another reason why training is needed. Our customers will naturally be more critical when service costs money. They could afford to be tolerant of our mistakes when they didn't affect their pocketbooks. Now that they know they are paying for an hour's time, however, they have a right to expect that the work will correct the trouble. Training should help us get the most out of that hour.

The phenomenal growth of our househeating and waterheating business makes training a necessity. We need more men to handle that service and cannot afford to wait the five years or more it used to take to develop a competent serviceman. We must remember that while actual experience is best, it is not the only teacher—that the only thing worse than too much theory is none at all. The type of men we are now getting in our service department can learn faster than the men we used to get. Every man is a high school graduate and over 90% of them are World War II veterans. They are young, intelligent, and anxious to make the most out of the work we give them. A formal training program is needed and will be welcomed by them. We would be falling down in our job if we failed to take advantage of this opportunity.

A training program will also be of help to our more experienced servicemen. Refresher courses on some phases of the work on old appliances, together with detailed instruction on the servicing of new equipment, are necessary supplements to field experience. There are few adages more false than this: "You can't teach an old dog new tricks." You can't if you don't try—but it's being done every day by those who are willing to make the effort.

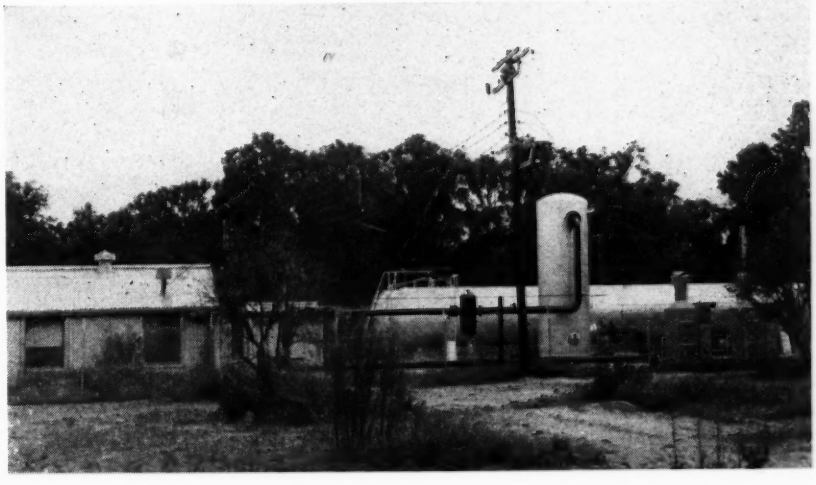
Not only will a well-administered training program bring out the latent possibilities in the employee—it should also be an invaluable aid in providing a clean-cut means of upgrading a man from one job classification to another. We may have a complete list of specifications for each job, but the means of determining the capabilities of a particular man for a particular job, however, are neither complete nor satisfactory. We have few definite milestones of information about the man and his ability to handle his work. The department head needs factual reinforcements to guide him. A job-rating plan is good only when the employees themselves believe in and have confidence in it. Incorporation of training techniques in classroom and field will, if they are fairly administered, hold the men's support. They may be the means of providing convincing evidence both to the superintendent and to the employee for his progress or lack of progress.

This then is how we propose to deal with our problem child:

1. **Development of a definite charge service policy.**
2. **Encourage strong plumber-dealer cooperative relationship.**
3. **Accept our share of responsibility in the field testing of new appliances in order to surpass performance of competitive equipment.**
4. **Increase our present househeating load just as fast as outside conditions permit.**
5. **Organize and administer a well-directed appliance service training program.**

No one person can outline a single plan to fit each company. But the problem is industry-wide. And we believe that in this five-point program will be found much that will contribute to a successful solution and will turn our problem child into a presentable member of the gas society.

New Propane-air Plant



View of new high-pressure propane-air plant at DeLand, Fla., on the properties of the South Atlantic Gas Co. Shown from left are the compressor house, pump house, two 30,000-gal. propane tanks, air receiver, and two 25,000-cfh gas air units. The gas air machines were constructed by Pacific Gas Corp. and installation was directed by H. E. Ferris, vice president of South Atlantic Gas Co.

According to President H. Hansell Hillyer, construction was necessary because of the rapid growth of the Florida city. Carburetted water gas was formerly served there, being transported through a 20-mile line from Sanford, Fla. The new gas has a 1000-Btu rating.

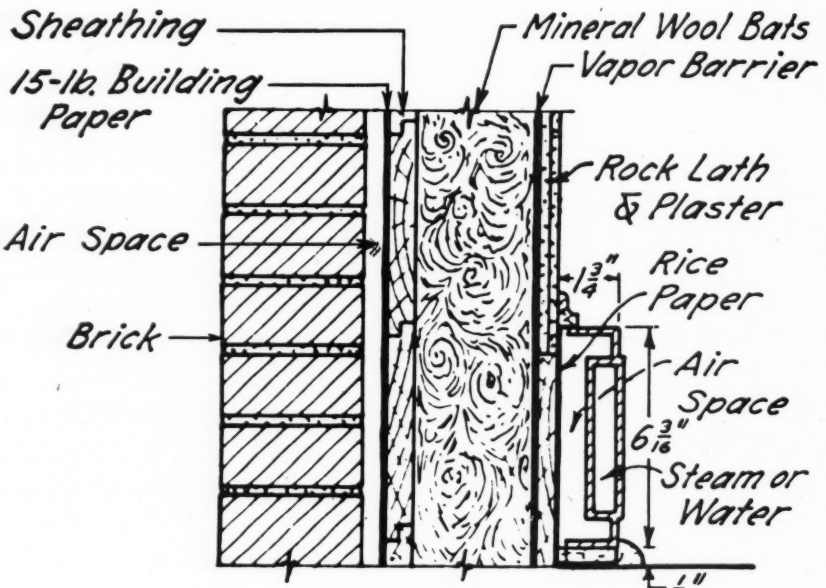
Radiant Heating AT THE BASEBOARD

By W. S. HARRIS

Department of Mechanical Engineering
University of Illinois

On Jan. 2, 1940, the Institute of Boiler and Radiator Manufacturers entered into an agreement for cooperative research with the Engineering Experiment Station at the University of Illinois, and subsequently built, furnished, and completely equipped the I-B-R Research Home specifically for research work in steam and hot-water heating. The house was completed early in January, 1941.

Under the terms of the agreement, the institute is represented by an Advisory Research Committee consisting of five members. It is the function of this committee to propose such problems for investigation as are of the greatest interest to the manufacturers and installers of steam and hot-water heating equipment. Of these problems, the Engineering Experiment Station staff selects for study those which can best be investigated with the facilities and equipment available at the University.



Detail of Radiant Baseboard Installation

Fig. 1 above. Fig. 2 appears on lower right.

IN 1943 an investigation was started by the Institute which had as its objective the determination of the effect of introducing heat into the rooms by means of long, low panels, heated by means of hot water. These panels, designated as radiant baseboard, were placed near the floor and extended along the exposed walls of the rooms. A second object was to compare the operating characteristics of the panels with the operating characteristics of conventional, small-tube radiators.

One reason why the Research Committee recommended this particular investigation was because of the general agreement among the members that the two major factors contributing to the rapid increase in popularity in this country of the panel heating system were: (1) that no part of such a heating system is visible in the rooms of the house, and (2) that a panel heating system does not interfere with furniture placement: Members of the Research Committee believed that if long, low, heating panels located near the floor and extending along the exposed walls of the rooms proved successful in operation, units could be designed which would harmonize with the other house furnishings to the extent that the heating units would scarcely be noticeable, and at the same time they would not interfere with furniture placement; thus, many of the advantages of a panel system would be gained without the necessity of any unusual construction features in the house. Also, such units could be used in the modernization of existing homes as they would not be an integral part of the house construction.

Presented at the Midwest Power Conference, Chicago, March 31.

House and Heating System

House—The I-B-R Research Home is a six-room, two-story building, typical of the small, well-built American home. The construction is brick veneer on frame, and all the outside walls and the second story ceiling are insulated with mineral wool bats 3⅝ in. thick. A vapor barrier offers resistance to the flow of water vapor from the heated spaces into the insulation or to the outdoors. This vapor barrier consists of a glossy-surfaced, asphalt-impregnated sheathing paper applied to the inside of the studs of all exterior walls, between the house and the garage, and on the bottom of the second story ceiling joists. The calculated coefficient of heat transmission for this wall section is 0.074 Btu per sq. ft. per hr. per deg. F temperature difference. All windows and outside doors are weather stripped, and during the tests described in this paper two storm doors were used. The total calculated heat loss for the house excluding the basement is 43,370 Btu per hr. with temperature of —10° F outdoors and 70° F indoors. The total floor area of the heated space is 1174 sq. ft. and the volume is 9393 cu. ft. The house is completely furnished and is ordinarily occupied by two people.

Heating System—The heating plant consisted of a two-pipe, reversed-return, gravity hot-water heating system, installed in connection with a three-section cast-iron boiler having

a net I-B-R rating of 55,000 Btu per hour. The boiler was supplied with a conversion-type gas burner, adjusted to a burning rate of approximately 100 cu. ft. per hr. of natural gas having a heating value of 1000 Btu per cu. ft.

The radiation used in the living room, dining room, all three bedrooms, and the lavatory was of an experimental design made in the form of a hollow cast-iron baseboard approximately 6 in. high. These units were designated as "radiant baseboard" and were installed along the outside walls of the rooms replacing the wooden baseboard, as indicated in *Fig. 1.* A photograph of a typical installation is shown in *Fig. 2.* A cross-section through the wall and radiant baseboard showing the method of installation is presented in *Fig. 1.* Rice paper, located between the wall and the radiator and securely fastened under the molding along the top of the unit, served as a dust seal to prevent the possibility of streaking the walls. Small-tube type, 19-in., 4-tube cast-iron radiators, shown by blackened rectangles in *Fig. 1,* were used in the vestibule, the kitchen, the bath, and on the stair landing. This system was designed to operate with a mean water temperature of 215° F and a 30° F drop through the radiators. The amount of radiation used in each room was just sufficient to offset the calculated heat loss of the house at design conditions.

The results obtained with the radiant baseboards were compared with those obtained from a similar plant in which conventional small-tube radiation installed in open recesses under the windows was used. Both plants were controlled by means of a heat-anticipating thermostat located in the living room 30 in. above the floor.

During all the tests a burning rate of approximately 100 cu. ft. of gas per hr. was maintained. The burner was adjusted so that a CO_2 content of from 9 to 10% was obtained at the smoke outlet of the boiler. The natural gas used was supplied from the Texas-Oklahoma pipe line, and had a high heating value of 1000 Btu per cu. ft.

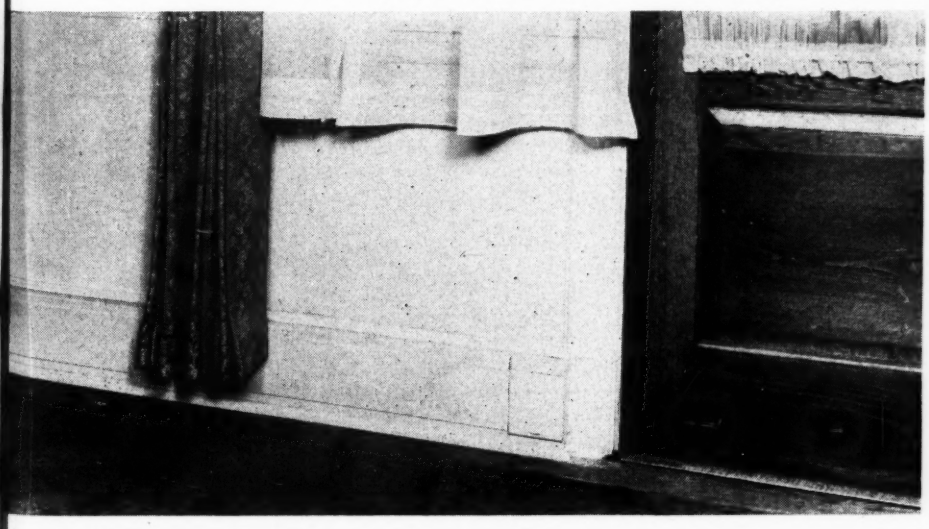
Each test was for 24 hours duration, and throughout the time tests were in progress the doors between rooms were open and all windows were closed. The thermostat was set to maintain a temperature of 72° F at all times. Observations of the room air temperatures, as determined by thermocouples located 3 in., 30 in., and 60 in. above the floor, and 3 in. below the ceiling, were recorded at 7 a.m., 11 a.m., 5 p.m., and 10 p.m. The temperatures of the air in the basement and the attic and the relative humidity in the heated portion of the house were also observed at these times. Complete daily records were made of the operating time, the number of cycles and the power consumption of the gas burner, and the cubic feet of gas consumed. Recording instruments were used to obtain continuous records of the stack temperature and draft, the CO_2, temperature of the water at the boiler outlet and return, the outdoor air temperature, the indoor relative humidity, and the air temperature in each room 3 in. and 30 in. above the floor and 3 in. below the ceiling. Other daily observations included the total amount of electricity, gas, and water used in the house, and general weather conditions.

Results

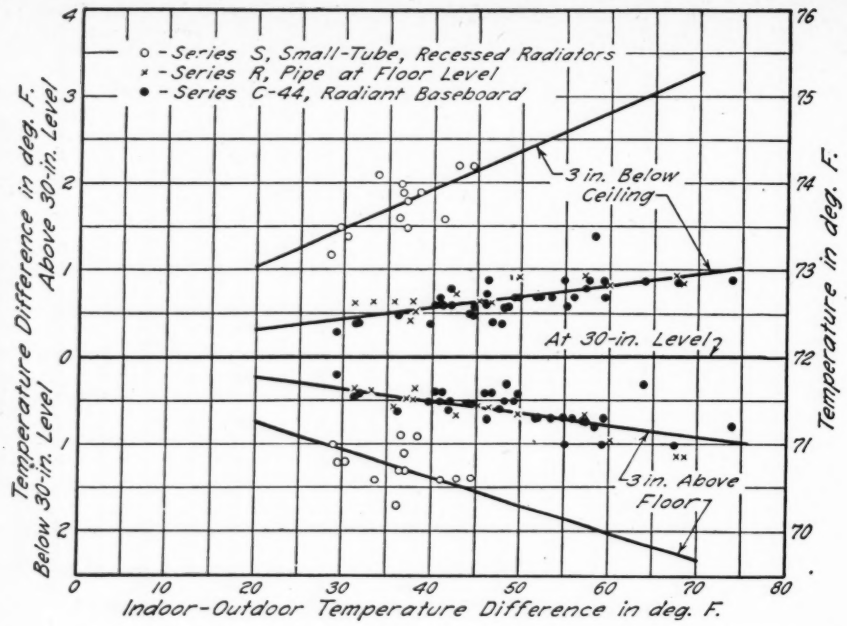
General — There are three different points of view to be considered in analyzing the performance of house heating systems. These are: (1) the degree of comfort produced within the space being heated, (2) the initial and operating costs, and (3) appearance and cleanliness of operation. From these three viewpoints, and based upon test results obtained in the I-B-R Research Home, a comparison is made in the following sections of this paper between the performance of small-tube radiation and baseboard radiation when operating under actual use conditions.

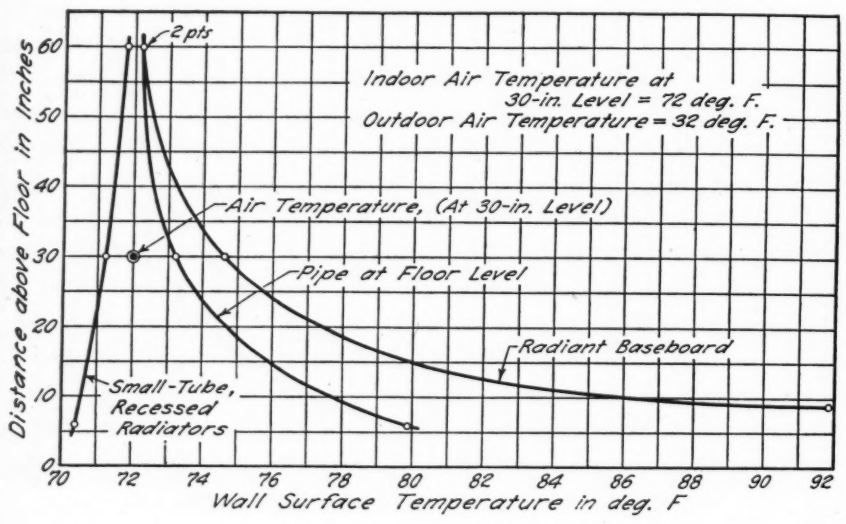
Comfort Produced—Among the factors affecting human comfort in heated rooms are (1) relative humidity, (2) air motion, (3) air temperature, and (4) wall, ceiling, and floor surface temperatures as well as the temperature of the furnishings in the room. Relative humidity does not enter into the present discussion since no moisture was added to the air while either type of radiation was being used; and, therefore, for given conditions of occupancy and outdoor temperature, the relative humidity was the same for both types. Smoke studies made in the rooms revealed that the maximum rate of air movement across the floor was approximately 25 ft. per min. or less. Since this velocity is within the limits of still-air conditions as defined by the American Society of Heating and Ventilating Engineers, it is evident that no uncomfortable drafts were present with either the small-tube radiators or the radiant baseboard.

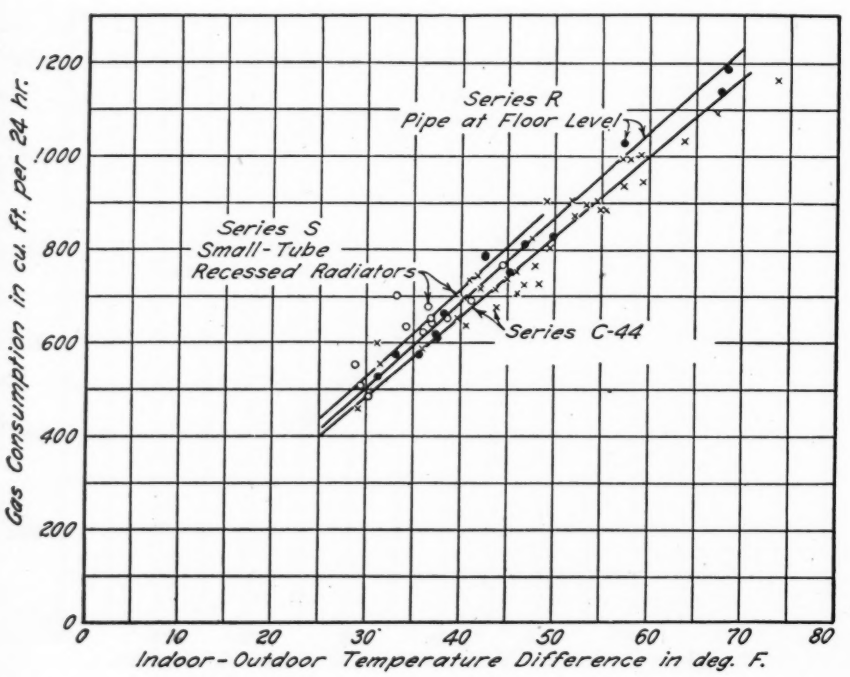
When changes were made in the type of radiation, all radiators in the second-story bedrooms were replaced while some of those on the first story were left unchanged. Hence, it was considered that only the air temperature differentials observed in the second story should be used in making comparisons of the operating characteristics of the two types of radiation used; therefore, the discussion of air temperature differentials is confined to data obtained in the three bedrooms. Data obtained in the first-story rooms showed characteristics similar to those obtained in the second-story rooms except that the floor to ceiling temperature difference was from 1 to 2° F greater.



As shown in *Fig. 3,* at an outdoor temperature of 0°F, when the three bedrooms were heated by the radiant baseboards, the average floor to ceiling temperature difference was only about 2° F, as compared to a 5½° F differential obtained when the rooms were heated by conventional recessed radiators. For the sake of clarity, only the temperatures 3 in. below the ceiling, at the 30-in. level, and 3 in. above the floor are shown. However, when the radiant baseboards, "Series C-44," were used the temperature at the 60-in. level was the same as that 3 in. below the ceiling. Thus the entire temperature difference occurred within a zone extending from 3 in. above the floor to the 60-in. level. At an outdoor temperature of 0° F,


o - Series S, Small-Tube, Recessed Radiators
x - Series R, Pipe at Floor Level
• - Series C-44, Radiant Baseboard
3 in. Below Ceiling
At 30-in. Level
3 in. Above Floor
Temperature Difference in deg. F. Below 30-in. Level
Above 30-in. Level
Temperature in deg. F.
Indoor-Outdoor Temperature Difference in deg. F.


2 pts
Indoor Air Temperature at 30-in. Level = 72 deg. F.
Outdoor Air Temperature = 32 deg. F.
Air Temperature, (At 30-in. Level)
Pipe at Floor Level
Radiant Baseboard
Small-Tube, Recessed Radiators
Distance above Floor in Inches
Wall Surface Temperature in deg. F



the temperature 3 in. above the floor was 71.1°F, the temperature at the 30-in. level was 72.0°F, and the temperatures 60 in. above the floor and 3 in. below the ceiling were each 72.9°F; the corresponding temperatures for "Series S," with the conventional recessed radiators, were 69.7°F, 72.0°F, 73.3°F, and 75.3° F, respectively. Thus it may be observed that the use of the radiant baseboard resulted in an air temperature 3 in. above the floor 1.4° F higher than that obtained with the conventional recessed radiators. It may be further observed from *Fig. 3* that this difference between the temperatures at the 3-in. level increased as the outdoor temperature was decreased.

Even more striking evidence of the tendency of the radiant baseboard to produce warm air near the floor is presented in the case of the lavatory on the first story. The floor of this lavatory, which adjoined the unheated garage, was an extension of the concrete floor of the porch and was laid directly on the ground. Conditions in the lavatory, which proved extremely difficult to heat with a conventional recessed radiator, are typical of those encountered in certain types of basementless houses.

At an outdoor temperature of 0° F the substitution of the radiant baseboard for the recessed radiator in the lavatory resulted in an increase of 6° F in the temperature of the air 3 in. above the floor, with no change in the temperature of the air at the 30-in. level. Furthermore, with the radiant baseboard the temperature of the air at the 3-in. level was essentially the same as that at the 30-in. level. A cold floor is a major factor in contributing to discomfort in otherwise well-heated rooms; hence the tendency to produce a warm floor may be regarded as an important attribute of radiant baseboards. This attribute is most important in the case of the basementless house in which cold floors are particularly prevalent. Therefore, the use of radiant baseboard seems to be especially adaptable to this type of construction.

In view of the results obtained in the lavatory of the Research Home a test installation of radiant baseboard is now being made in a five-room, prefabricated, basementless house having

---

TOP TO BOTTOM:

Fig. 3. Second-story air temperature differentials.

Fig. 4. Inside surface temperature of north wall of living room.

Fig. 5. Fuel consumption curves.

a concrete floor slab laid directly on the ground. While this house is to be occupied by a family, permission has been granted to conduct tests for two winters, and in this time, important operating data on radiant baseboard in basementless houses will be obtained supplementing that already obtained in the Research Home.

Fig. 4 shows the wall surface temperatures, measured on the inside surface of the plaster on the north wall of the living room, resulting from the use of the conventional recessed radiators and the radiant baseboard. At the times these observations were made, the outdoor temperature was approximately 32° F and the temperature of the air in the living room at the 30-in. level was 72° F. It may be observed that with the radiant baseboard the temperature of the entire wall below the 60-in. level was greater than the temperature of the room air at the 30-in. level, whereas with the conventional recessed radiator the temperature of this portion of the wall surface was from 0.2 to 1.6° F below the temperature of the air at the 30-in. level. At lower outdoor temperatures the wall surface temperatures were even higher when using the radiant baseboard, and somewhat lower when using the small-tube radiators than the corresponding values given in *Fig. 4*. Thus the radiant baseboard warmed the entire surface of the portion of the exposed wall along which they were installed. On the other hand, with the conventional recessed radiator only the small portion of the wall forming the back of the recess was warmed, and this contributed nothing to comfort because this portion of the wall was hidden by the radiator, which was at a much higher temperature.

If all other factors except the wall surface temperature remained unchanged, the increase in the wall surface temperatures accompanied by the use of radiant baseboard would result in an increase in the mean radiant temperature in the room. However, measurements made at the 30-in. level by means of both a thermo-integrator and a globe thermometer in five different locations in the living room proved that with conventional recessed radiators the mean radiant temperature was about 1°F. higher than the air temperature and, with radiant baseboard, the mean radiant temperature was from 0.5° to 1.0° F lower than the air temperature. This condition is just the reverse of that to be expected from the wall surface temperatures obtained with the two types of radiation. The higher mean radiant temperature obtained with the conventional recessed radiators must have been the result of the higher ceiling temperatures accompanying the use of these radiators. These mean radiant temperature observations indicate that, even though the use of radiant baseboard results in warmer air near the floor and in warmer inside surfaces for the exposed wall, in order to produce the same degree of comfort it is necessary to maintain the same air temperature at the 30-in. level with the radiant baseboard as is required with the conventional recessed radiators. *Hence, the main advantage of the radiant baseboard lies in the fact that the use of this type of radiation insures that warm floors will be obtained.*

Operating Cost—The fuel consumptions obtained with the two types of radiation are shown in *Fig. 5*. It may be observed from the curves for Series S and for Series C-44 that when radiant baseboard was used a reduction of approximately 8% occurred in the fuel consumption. However, owing primarily to differences in the basement piping for the two heating systems, an air temperature of about 70° F was obtained at the basement ceiling during the tests using radiant baseboard as compared with a temperature of approximately 75° F obtained during the tests of the small-tube radiators. It is probable that the decrease in fuel consumption should be attributed to this 5° F decrease in basement temperatures, which caused a decrease in heat loss from the house. *Hence it seems safe to assume that no material difference in fuel consumption can be attributed to the inherent characteristics of the two types of radiation.*

In any case, variations in the effect of wind and sunshine are liable to result in deviations of as much as 5 per cent from the averages of the fuel consumptions represented by the plotted curves. For this reason, differences in the magnitudes of the order of those shown in *Fig. 5* cannot be regarded as significant, and to all intents and purposes the fuel consumptions obtained with the radiant baseboards and the conventional recessed radiators can be considered as practically the same.

Appearance and Cleanliness—As noted in *Fig. 2* the radiant baseboard blended in with the wood trim of the room in appearance so as to make the unit relatively inconspicuous. The placement of furniture near the radiant baseboard did not seem to impair its performance. In one of the bedrooms slightly over 30% of the total radiation was installed under the bed. The bed was located against the wall. No trouble was experienced in heating this room under these conditions and the student sleeping in this bed every night stated that the radiation did not make the bed uncomfortably warm, even though the unit was not turned off during the night. In other rooms such articles of furniture as chairs, tables, and desks were placed within a few inches of the radiant baseboard and in no case was any damage done to the finish on any piece of furniture nor did the furniture interfere with the proper operation of the heating units.

Immediately after the radiant baseboard was installed and before any heat was required, all the walls were freshly painted and all curtains and draperies were cleaned. After operating through a complete heating season of approximately nine months no dirt patterns were observed on the walls above the radiant baseboard, and there was no evidence that the heat had discolored the paint on the wall. Furthermore, at the end of the heating season, the white curtains at the windows over the radiant baseboard were as clean as were similar curtains at the windows under which no radiators were located. In neither case was cleaning required. On the other hand, characteristic dirt patterns appeared on the walls above the conventional recessed radiators on the stair landing and in the kitchen, and the curtains above these radiators were in need of cleaning long before the end of the heating season.

Summary

The principal object of these tests was to determine the comparative operating characteristics of radiant baseboard and small-tube radiators used in conjunction with a hot-water heating system operating in the I-B-R Research Home under actual use conditions. The results of these tests indicated that:

1. Drafts were not experienced with either radiant baseboard or small-tube radiators.
2. Radiant baseboard produced warmer floors and cooler ceilings than did the small-tube radiators, a characteristic which makes them adaptable to basementless houses.
3. From the 60-in. level to the floor, the inside surface of the walls along which radiant baseboard was installed were warmer than the room air at the 30-in., or thermostat, level, whereas these surfaces were cooler than the room air when the small-tube radiators were used.
4. For a given room air temperature, the mean radiant temperature appeared to be slightly less when using radiant baseboard than when using small-tube radiators.
5. The fuel consumptions obtained with the radiant baseboard and with the small-tube radiators were essentially the same.
6. The radiant baseboard was clean in operation.
7. The radiant baseboard blended with the wood trim of the room and did not interfere with the placement of furniture.

INSTRUCTIONS FOR USING THE

BURNER PORT CHART

A new chart for use in converting gas appliances, developed by the author and presented exclusively on Pages 56, 57.

By P. A. RAY

Hastings (Minn.) Gas Co.

In 1929 P. A. Ray joined the Northern States Power Co. at Faribault, Minn., working first in the substation department and then the refrigeration department. In 1933 he was transferred to the gas department, coincident with the change to natural gas, and was gas heating engineer for the towns of Faribault and Northfield from 1935 to 1939. In 1939 he joined the Minnesota Natural Gas Co. at Worthington as superintendent. He was employed in his present job as local manager of the Hastings Gas Co. in 1940. Now he also serves as gas engineer for the parent company, United Cities Utilities Co.

IN converting a gas appliance in service to utilize some gas other than that for which it was designed, attention to only the barest necessities will usually result in faulty operation. It is not sufficient merely to provide an orifice of the correct drill size for the gas served. Each type and quality of gas has a specific port requirement. This factor may vary between different types of gas burners, but such variations are usually within general limits. Neither is it sufficient to drill all ports for any one class of burner, such as water heater burners, a uniform size regardless of the number of ports involved.

Exclusive

There are many factors involved in the design of burners for various gases. However, in the field it is usually possible to change only the ports and the orifice. This discussion is concerned with the provision of proper ports as required in the utilization of several of the gases commonly served today. Only the atmospheric or bunsen type burner is covered, as the major portion of the burners in use today are of this type.

The mathematics of determining the total port area and the Btu input per square inch of total port area (port loading) for a given burner are cumbersome and subject to human error to a high degree. Assuming that these factors have been determined, and it is discovered that the port area as provided is not sufficient for the gas involved, the further determination of what changes are necessary and possible is too time-consuming and difficult to be practical in field work.

The author has developed a burner port chart that will simplify the task of solving port problems in conversion work. The chart may be used first to determine that a given burner will or will not operate satisfactorily with the gas in question. When a change is indicated, the chart may then be used to determine those changes.

The solution of port problems usually involves five factors. These are the total number of ports, the size of the ports, the total port area, the rated burner input, and the port loading (input per square inch of port area). The port chart, in fact, is composed of two charts or graphs. The first graph combines the factors of port size and the number of ports to determine the total port area. The second graph combines rated burner input and allowable port loading for the gas involved to determine necessary total port area. Since each of these graphs has a common factor, total port area, it is possible to combine them to provide a single graph which may be used to solve these problems readily in the field. The well trained utility field or service man can use this chart to solve rapidly and correctly many of his problems.

The base of the chart is tabulated in terms of square inches area of a single port. The range is from .002 to .014 sq. in. Wire drill sizes Nos. 30 to 54 inclusive are also indicated along this line. The left hand side or the ordinant of the chart is tabulated in terms of total number of ports. The range is from 0 to 180 ports.

The graph curves are tabulated in terms of total port area. The range is from 0.2 to 1.2 sq. in. total port area. There are 11 curves in all, in steps of 0.1 sq. in.

To find the total port area of a burner, determine the drill size of the ports and the total number of ports. Locate at the bottom of the chart the drill size involved and follow the vertical line upward to a point where it is intersected by a horizontal line from the left side corresponding to the number of ports as determined. This point will determine the total port area. Frequently the intersecting point will fall between two curves rather than directly on any one curve. The total port area in this case is determined by interpolation. Thus if the point is half way between the 0.4 and 0.5 curves, the total port area would be 0.45 sq. in.

This portion of the chart may be used for several purposes. If any two of the three factors is known, the third may be found. If we know that a burner requires a total port area of 1 sq. in. and there are 134 ports we will find that the chart calls for drill size No. 40 port.

The top line of the chart is tabulated in terms of rated burner input, i.e., the Btu input for which the burner is designed or for which it is desired that the burner be adjusted. The range is from 3600 to 23,400 Btu per hour in steps of 180 Btu.

The right hand side or ordinant of the chart is tabulated in terms of Btu input per square inch of total port area, or what is more generally known as port loading. The range is from 11,250 Btu to 90,000 Btu per sq. in. of port area. It is difficult to differentiate between this factor and that of rated burner input. If we think of rated burner input in terms of distance or miles traveled and port loading in terms of speed or miles per hour it will help us understand the difference between these two factors.

The third factor on this second half of the chart is total port area. The curves for this factor that are used for the first half of the chart are also used for the second half.

The use of this second portion of the

chart is similar to that of the first portion. If any two factors are known the third can be determined. Thus, if we find that a burner is rated at 9000 Btu input and has a total port area of 0.50 sq. in., the chart will show that the port loading is 18,000 Btu per sq. in. of port area. As a further example, if we know that the port loading for a particular gas should be 15,000 Btu per sq. in. of port area, and the burner in question has a total port area of 0.6 sq. in., we will find from the chart that the burner may be successfully rated at 9045 Btu input per hour.

The two portions of the chart having become familiar, the final step is to combine them to provide all information required for the solution of many of the port problems encountered in conversion work. In doing this it is often confusing to transfer from one portion to the other. Careful examination will indicate that the position of the point determining the total port area of a burner from the size and number of ports is not the same as the point used in determining rated input or port loading. In transferring from one portion to the other, it is essential to follow the curve to a new point determined by the intersection with vertical or horizontal line from the factor being considered. When interpolating between total port area curves it is essential to maintain the relative positions between the curves in transferring from one portion to another.

The simplest function of this chart is to determine that a given burner will or will not operate properly on the kind of gas available. As an example, let it be assumed that a burner has 120 ports sized drill No. 36, that the rated input is 20,000 Btu, and that the correct port loading for this particular gas is between 18,000 and 20,000 Btu per sq. in. of port area. First, we will locate the vertical line for drill size No. 36 and the horizontal line for 120 ports. At the intersection of these two lines we will find that the total port area is approximately 1.08 sq. in. The vertical line from the top of the chart for 20,000 Btu is then located and the curve followed to an intersection with this line. Drawing a horizontal line from this point to the right hand edge of the graph will show that the port loading is between 18,000 and 20,000 Btu per sq. in. of port area. As this falls within the limits set up we know that this burner will operate satisfactorily on that gas.

One further function of this chart would be to determine the proper port drilling for a burner on a given gas. Using the same example as before we might change the specifications to a port size Drill No. 38. We would find that the burner then had a port area of 0.98 sq. in. Following this curve to the intersecting vertical line for 20,000 Btu rated input and then to the right to the port loading ordinant, we find that this loading is greater than the gas will allow. By working the original example backwards we would determine that the proper drill size for the ports was No. 36.

Occasionally it is necessary to service a burner for which the rated input is unknown. Assuming that the burner is properly designed for the gas in question, it is possible to determine the rated input with this chart. Knowing the number of ports, the size of the ports and the proper port loading for the gas, we can easily determine the correct input for the burner.

Another function of the chart would be to determine the number of ports required for a burner when the size of the port was limited to one drill size. Following the above example, it should be easy to see the method used for the solution of such a problem. Users will find, as they become acquainted with this chart, many uses for it not covered in these instructions.

It will be noted that on the chart there are two heavy vertical and two heavy horizontal lines. These are the limiting lines for a particular gas. In this case the gas is a butane-air with a heating value of 1300 Btu per cu. ft. The horizontal lines indicate the limits for port loading with this gas, and the vertical lines the normal limits in drill sizes. Occasionally, port sizes larger or smaller may be used with this gas, but in the major number of cases it has been found that staying within these limits will assure the best operation. The normal limit lines for port sizes for other gases will differ from these lines in accordance with the combustion characteristics of that gas.

In the case of butane-air gas the limits for port loading are very rigid. To load the ports heavier than the limits invariably results in poor operation. The port loading limits with other gases are not as narrow as for this particular gas. The manufactured gases have the broadest ranges with natural gas having a narrower range just slightly greater than the liquefied petroleum gases. In using the port chart, it is most important to know the limits for the gas being considered.

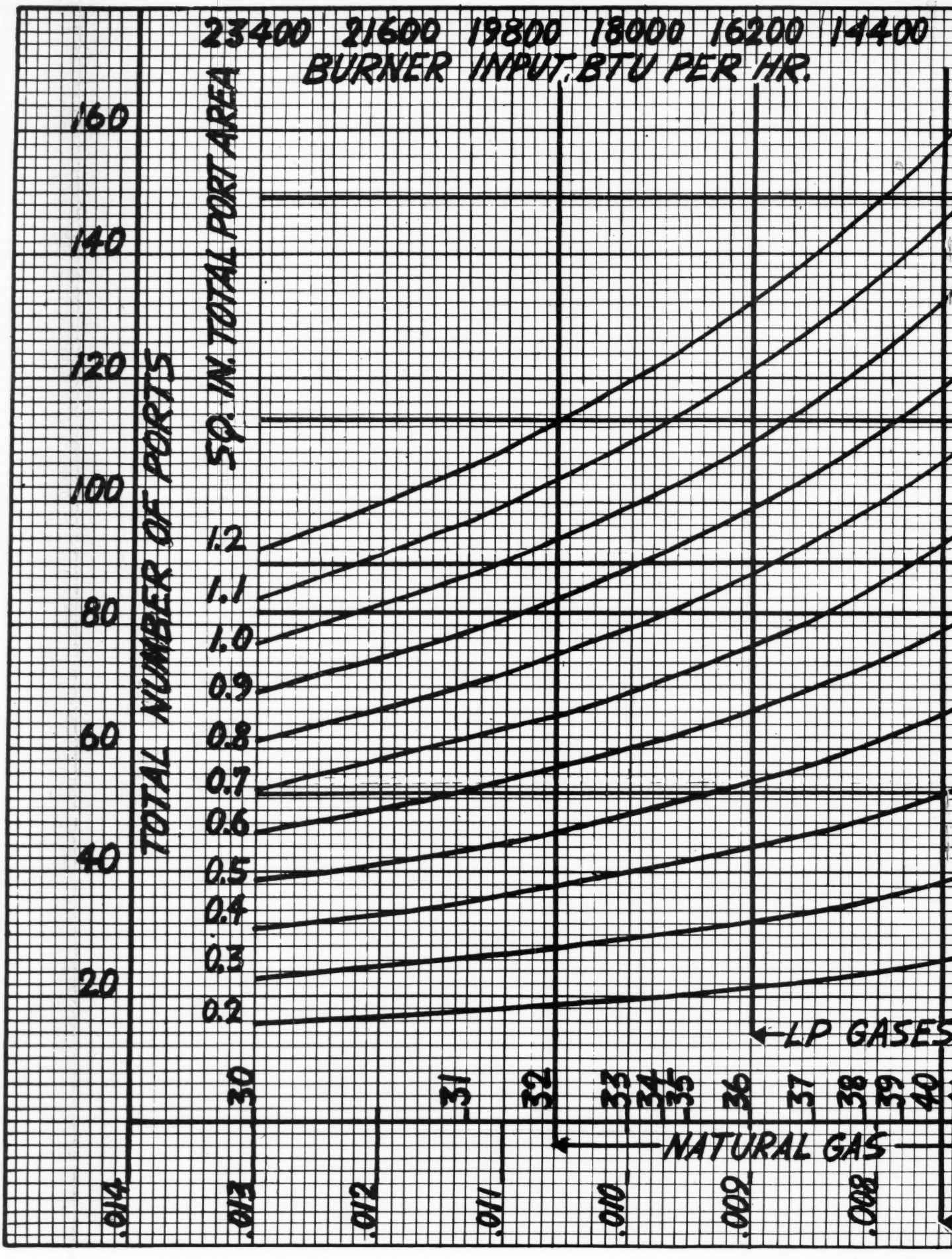
The limits for port loading for several other gases are also noted at the right hand side of the chart. They are: 16,000 to 22,000 Btu per sq. in. of total port area for butane or propane-air gases with a 500 to 550-Btu heating value; 12,000 to 20,000 Btu per sq. in. of total port area for natural gases; and 20,000 to 35,000 Btu per sq. in. of total port area for the manufactured gases. The use of the chart with any particular gas will require the testing of a few burners of the proper design for that gas to determine accurately the limits to be used for that gas. If such a test is impossible or if burners for the gas involved are not available, experimental drilling of several common burners with the use of the general limits shown by the chart will soon indicate the actual limitations for that gas. The limitations on the chart cover a fairly broad field in each type of gas, of which there are many variations in use today.

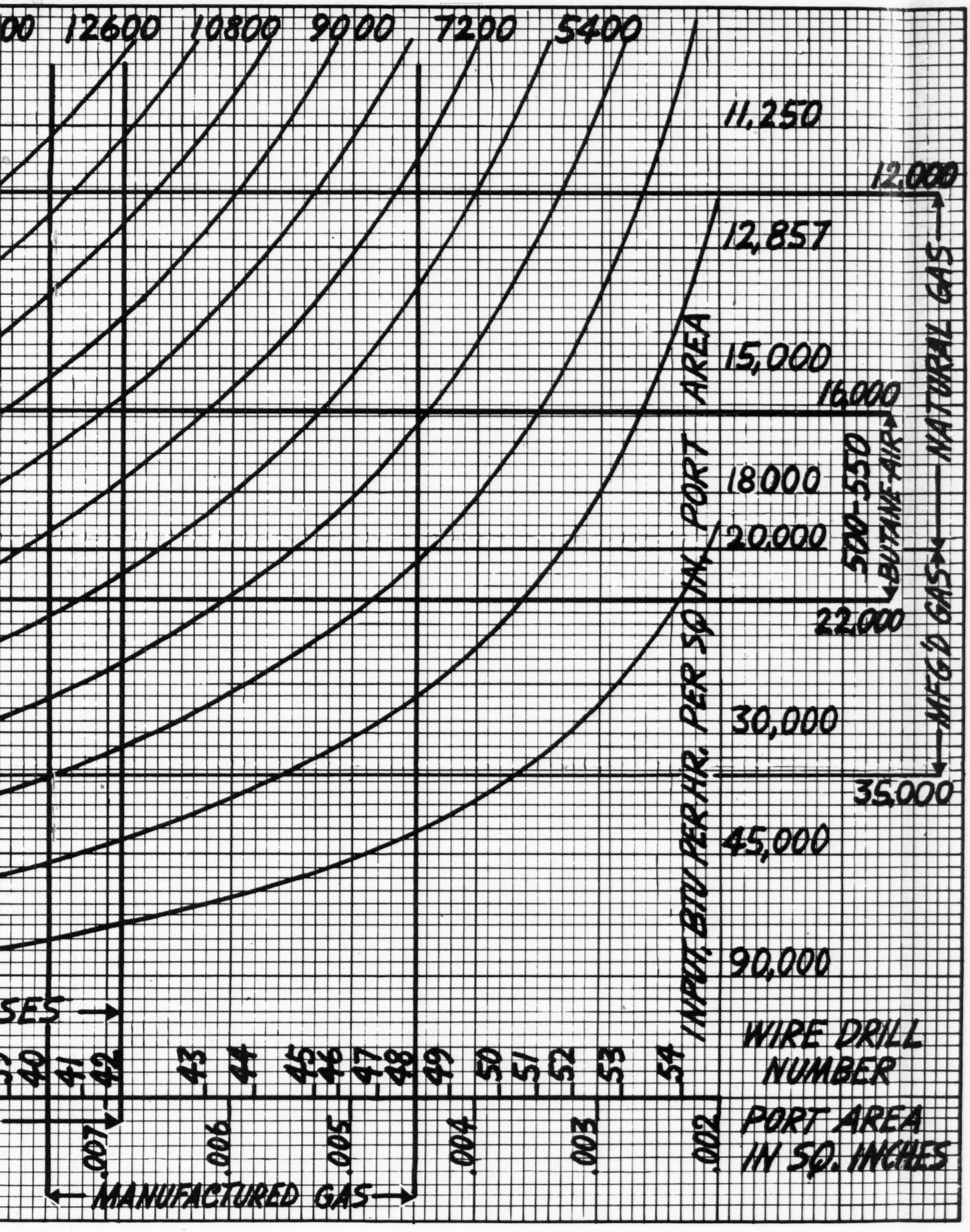
The field of liquefied petroleum gases will be of particular interest. Most of the author's experience has been in the butane-air field. This experience has shown that as the heating value of this type of gas is increased the limits in port loading tend to narrow. The chart readily indicated this fact in the difference in the limits for 500-Btu butane-air and 1300-Btu butane-air. It is believed that this trend will follow in determining the port loading limits for this type gas in various heat contents, for example 800 to 900 Btu.

The use of the chart in extended conversion work during the past two years has also indicated that a small burner may be safely loaded to the maximum limit while larger burners should tend to the minimum limit.

The limits in port sizes for three general types of gases are noted at the base of the chart. The left hand limit for each gas is of the utmost importance. The use of larger ports than those indicated will frequently result in serious difficulties due to flashback or noise of extinction. The right hand limit or smaller drill size indicated for each gas is more general. In most cases it will be found that the use of smaller drill sizes will result in future service calls due to port clogging or rusting.

The author does not intend that this chart be used as a guide in burner design. Many other factors are involved in the design of gas burners, any or all of which might result in the limitations as indicated on this chart becoming completely erroneous. Neither is it expected that the chart will provide a simple answer to every conversion problem involving ports. The physical construction of some burners will not allow the changes required. Occasionally a burner will be so poorly designed that the changes required, although physically possible, will not provide good operation. However, the major portion of conversion problems in port changes can be solved easily and accurately with this device.


23400 21600 19800 18000 16200 14400
BURNER INPUT, BTU PER HR.
TOTAL NUMBER OF PORTS
SQ. IN. TOTAL PORT AREA
160
140
120
100
80
60
40
20
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
LP GASES
NATURAL GAS
30
31
32
33
34
35
36
37
38
39
40
.014
.013
.012
.011
.010
.009
.008


00 12600 10800 9000 7200 5400
11,250
12,000
12,857
15,000
16,000
18,000
20,000
22,000
30,000
35,000
45,000
90,000
500-550 BUTANE-AIR
NAT'URAL GAS
MFG'D GAS
INPUT, BTU PER HR. PER SQ IN. PORT AREA
SES →
40 41 42 43 44 45 46 47 48 49 50 51 52 53 54
WIRE DRILL NUMBER
.007 .006 .005 .004 .003 .002
PORT AREA IN SQ. INCHES
← MANUFACTURED GAS →

Mixing Oil Gas With Butane

Last winter Portland successfully used butane on frequent occasions for peak loads, adding it in proportions as high as 40% with good results

By D. B. LARSON

Portland Gas & Coke Co.
Portland, Ore.

BECAUSE of the warm winter weather that has prevailed in Oregon since 1943 there was comparatively little occasion for the use of butane-air gas after the initial experience that year, until last winter. This also was a mild winter compared to the average expectancy in the area, but by this time the postwar demand for gas, particularly for househeating, had built up a load which was beyond the capacity of the oil-gas plant, even in moderately cold weather. The district plants, therefore, saw service almost every day during the winter season; and the principal butane plant in Portland, which had been enlarged in the meantime to a 500-Mcf per hour capacity, was called upon quite frequently. For the first time, therefore, enough operating experience was acquired to enable us to reach some definite conclusions with respect to various items involved in the original plant design.

One of the most important questions which came up in the initial study of the feasibility of using butane in the Portland system was the extent of interchangeability between butane-air or propane-air and the 570-Btu oil gas normally distributed. At that time the available information concerning the performance of mixtures of such widely different gases was quite meager, and an extensive series of laboratory tests was therefore undertaken to determine the amount of butane-air gas that could be introduced and the characteristics of the resulting mixture. From these tests it was concluded that the limiting factor was the increasing tendency of the flame to leave the burner as more butane-air gas was introduced, and since unsatisfactory operating conditions were reached on some of the older types of burners with a mixture containing about 35% butane-air by volume, it was decided to set 30% as the maximum limit for operating purposes.

Higher Percentages Feasible

Actual field experience, however, has demonstrated that higher percentages than those indicated by the laboratory tests are entirely satisfactory. As much as 50% butane-air has been sent out during special test periods without any unfavorable customer reaction, but observers stationed at various locations in the distribution area during these tests reported that the flames were rather uncertain with a 50% mix, and the revised operating limit was therefore set at 40%. Operation on this basis has been entirely satisfactory. The increase in the limit from 30% to 40% has, of course, added materially to the effectiveness of the L.P.G. plants in adding to peak load capacity.

The original program contemplated making a 1000-Btu butane-air gas in order that the Btu input to the appliances with fixed orifices would remain approximately the same as with the oil gas. At this point the reduction in flow (due to the higher specific gravity) and the increase in Btu per cubic foot offset each other and leave the Btu input unchanged. There is one disadvantage in that the customer receives a 1000-Btu cubic foot when he is only billed for a 570-Btu cubic foot, but under ordinary circumstances where the butane-air gas will only be used for a few days per year this is not a very serious matter.

Btu Considerations

From another standpoint there is a very definite advantage in distributing a high-Btu gas. The laboratory tests indicated that the amount of butane-air gas that could be introduced into the 570-Btu oil-gas was not materially affected by the Btu of the butane-air gas over a wide range of variation. Because of this situation, the maximum utility of the LP-Gas plants in reducing peak-load oil gas demand is reached with a high-Btu butane-air gas. In the original plant design no provision was made for a close control of the Btu of the butane-air mixture, in view of the lack of sensitivity to Btu variations, but operating experience has shown the need of such a control in order to make certain that the peak load gas does its full duty. The usual concern over meeting legal Btu standards is, of course, absent in this case. Even a very wide deviation from the 1000-Btu figure would still leave the gas far above the 570-Btu standard.

The matter which caused the greatest amount of concern in connection with the 1946-47 winter operation of the LP-Gas plants was the question of butane supply. The original operating plans were predicated on the assumption that it would be possible to obtain some butane during the winter season and that it would not be necessary to provide storage sufficient to take care of the entire winter consumption. In previous years this proved to be the case, but extreme difficulties were encountered in getting any shipments after the beginning of the 1946-47 winter season, and some tankage which was not completed before Nov. 1 did not get filled until spring. The plants normally use a blend of propane and butane. Consideration was given to the possibility of utilizing some of the heavier hydrocarbons which could be shipped in casing-head gasoline cars, thus circumventing the tank car shortage which was the principal factor in the short supply situation, but satisfactory operation of the vaporizing and mixing units could not be obtained with this material and the project was therefore abandoned.

Another point which will require considerable attention is the reaction of company servicemen and other operating employees to the peak load use of butane. Unfortunately the butane plants are in a difficult situation from a psychological standpoint. They operate only during peak loads when

D. B. Larson

ADD PORTLAND Gas & Coke Co. to the list of successful users of LP-Gases for peak load operations. With oil gas as its basic load, the company has added butane-air in proportions as high as 50% into its system with some results, and has settled on 40% as a safe operating maximum. It has also noted that the high Btu content of the gas in itself has been an advantageous factor in meeting peak loads.

The man who reports the company's experience has had long experience with the company, having been superintendent of distribution since 1928. He was graduated from Oregon State College in 1922.

Presented at the PCGA Transmission and Measurement Conference, Fresno, Calif., May 14.

service difficulties of one kind or another are naturally also at a peak. The ordinary workman, noting that more service trouble occurs during the time that the butane plants are operating, is likely to jump to the conclusion that the butane gas is the cause of the trouble; and from present indications it appears it will not be any easy task to correct this impression, although careful analysis indicates that very little operating trouble is legitimately chargeable to the butane mixture.

Pressure Drop

An item whose significance was not fully realized in the original study of the butane program came into prominence rather forcibly on the first occasion when gas containing the maximum percentage of butane was sent out into the low pressure distribution system in Portland. The oil gas normally distributed in this area has a specific gravity of about 0.4 and there is consequently an appreciable static pressure gain in the distribution lines between the holders and higher elevations, which adds to the capacity of these mains. As soon as the heavier mixture was put into the system about half of the static pressure vanished and the low pressure reports which promptly came in from the most unexpected places demonstrated the necessity for some definite counteraction. Under the procedure now in effect the station pressures on the system are increased by a specified amount when the butane operations are started.

Another interesting bit of information brought to light by the butane operations is the relation between the speed of the gas travel in the mains and the speed of the pressure wave when the pressure is increased or decreased. Prior to last winter there had been little or no occasion to check the speed of the gas travel as the time required to increase or decrease the pressure was the only significant item. During the changes back and forth from straight oil gas to mixed gas this has become a matter of some importance as it has frequently been necessary to coordinate the operations of the district plants with those of the Portland plant. In checking this matter the pressure wave has been found to travel several times as fast as the gas. Between Portland and Granger, for instance, an increase in pressure can be obtained in a little less than two hours, whereas the gas takes from five to six hours to travel this distance of about 80 miles.

In conclusion, it may be said that these butane plants have given a very creditable performance thus far. There have been troubles—plenty of them. All too often a unit is reported out of order when it is urgently needed to carry the load. But it must be remembered that these are emergency plants that stand idle throughout the greater part of the year and then are expected to jump into service with little or no advance notice, under the guidance of operators who have small chance to get well acquainted with their plants before the "cease firing" order is issued. If their performance is judged on this basis rather than in comparison with some smooth-running 365-day operation, they have made a good showing and there is little question in Portland but that LP-Gas for peak loads is here to stay.

NBS Adds Seven New Hydrocarbons

TABLE 1. SEVEN NEW HYDROCARBONS

NBS sample number [a]	Compound	Amount of impurity [b]	Volume per sample [c] (liquid)	Price per sample
		Mole percent	*ml*	
253-5S	2,2,4-Trimethylhexane	0.30±0.20	5	$35.00
542-5S	2,3,3-Trimethylhexane	.13± .06	5	35.00
255-5S	2,3,5-Trimethylhexane	[d] (.30± .20)	5	35.00
517-5S	*n*-Butylcyclopentane	.034± .025	5	35.00
519-5S	1-Hexene	.14± .08	5	35.00
527-5S	*trans*-2-Hexene	.17± .11	5	35.00
538-5S	2-Ethyl-1-butene	.10± .04	5	35.00

[a] The designation "-5S" following the sample number indicates a sample of 5 ml sealed "in vacuum" in a special Pyrex glass ampoule with internal "break-off" tip.

[b] The purity has been evaluated from measurements of freezing points, as described in J. Research NBS 35, 355 (1945) RP1676, unlike otherwise indicated.

[c] Tolerance approximately ±10 percent.

[d] Estimated by analogy with isomers subjected to similar purification.

Seven new NBS standard samples of hydrocarbons just announced bring to 119 the total of these compounds now available for calibrating analytical instruments and apparatus in the research, development, and analytical laboratories of the petroleum, rubber, chemical, and allied industries, the National Bureau of Standards has announced. Since 1944, when the first of these NBS standard samples of hydrocarbons were made available, 100 additional compounds have been prepared through a cooperative undertaking between the bureau and the American Petroleum Institute's Committee on Hydrocarbons for Spectrometer Calibration.

The seven new compounds are as shown in *Table 1.*

Instructions for transferring standard samples of hydrocarbons "in vacuum" are available on request. A complete list of NBS Standard Samples of Hydrocarbons, together with instructions for ordering, may also be obtained from the National Bureau of Standards, Washington 25, D. C.

Purging Lines With Inert Gas

By K. B. ANDERSON

Coast Counties Gas and Electric Co., San Francisco

IN December of 1946, our company completed the laying of approximately 10 miles of 10-in. pipe for the purpose of augmenting the supply of gas to the city of Santa Cruz. This line was provided with valves and blow-offs at the initial and terminal ends and at approximately the midpoint.

In order to eliminate the possibility of developing an explosive mixture in the line during the time the line was being placed in operation and the air in the line being purged out by the natural gas, it was decided to fill a

portion of the line with inert gas which could be pushed through the line as a slug ahead of the entering natural gas. This method of purging was quite thoroughly covered in a paper entitled "Combustible Gas Mixtures and Pipe Lines," prepared by Elting Henderson in 1941 and published in the PCGA proceedings of that year.

After the completion of the standup test on the line, the line was blown down to atmospheric pressure and all valves were closed. The exhaust manifold of the engine on a gas engine-driven compressor was then connected to the line at the initial end and the back pressure on the engine exhaust, the engine carburetor and the engine loading adjusted to give an exhaust gas analysis of 13.5% CO_2, 0% CO, 0.5% O_2 and (by difference) 86% N_2. The blowoff on the upstream side or the midpoint valve was then opened and the engine was kept running until the gas analysis obtained at the upstream side of the valve at the midpoint of the line was essentially the same as that at the initial end. This left the initial half of the line filled with the inert gas and the terminal half of the line filled with air. When these operations had been completed, the line was tied in to the source of supply at the initial end and we were ready to start the introduction of natural gas into the line.

At the time the natural gas was introduced at the initial end of the line, the valve at the midpoint of the line was opened and the line packed rapidly to a pressure of 50 psi. The valve at the initial end was then closed and the blowoff at the terminal end opened. As the line was blown down, the gas being purged was analyzed at each 5-lb. increment of pressure drop. At 45 psi an analysis of 1.2% CO_2 was obtained, at 40 psi the analysis was 13.2% CO_2, and at 35 psi the analysis was again 1.2% CO_2. At the next reading the CO_2 analysis was 0 and at the next two readings 1.2% and 2.0% respectively. These readings would indicate that the slug of inert gas was quite well defined and had become only slightly diffused with the natural gas. After the CO_2 readings had again returned to zero, the blowoff was closed, the valve at the initial end of the line again opened, and the line packed to its normal operating pressure. The line was then placed in operation.

Calculations indicated that the length of the inert slug, at 50 psig, was 8000 ft., and that during the blowdown it traveled at an average rate of 800 ft. per minute; also that the 100 cu. ft. per min. compressor provided 1200 cu. ft. per hr. of inert gas.

Main line under construction, showing almost impenetrable terrain.

Tough Sledding On Ozark Line

A pipeliner's nightmare has come true for officials of the Arkansas Western Gas Co., Fayetteville. Under a million-dollar expansion program they are laying 86 miles of pipe through almost solid rock in the Ozark mountains.

In order to lay a 6⅝-in. line in a 3-ft. ditch, it has been necessary to blast through flint rock. There is no backfill—cover dirt must be hauled in for miles before the line can be buried. In order to traverse the rugged slopes of the range, sleds had to be constructed of 8-in. pipe to use as conveyances for carrying the line to the top.

The line originates at St. Paul Junction, 17 miles north of Ozark on the Ozark-Fayetteville main transmission line, and extends 46 miles to the Berryville Wye, thence eastward 30 miles to Harrison, and westward from the Berryville Wye 12 miles to Eureka Springs. Six new towns are to be served: St. Paul, Huntsville, Berryville, Eureka Springs, Alpena Pass, and Harrison.

When construction is complete, Arkansas Western will have added 3500 to its present meters-served total of 14,000. The new towns added will bring to 41 the total of cities served.

Service to Berryville began in July, President L. L. Baxter has announced.

Laying distribution system in Berryville.

Power Conference

Experiences with "Fuel Economy" since 1939, as well as future developments in the power field, will be the subject of the papers and discussions at the sectional meeting of the World Power Conference to be held in The Hague, Netherlands, Sept. 2-9.

Improved techniques in the gas industry which open fields for further development will be discussed among subjects in a preliminary technical program divided into three sections—production, distribution, and utilization.

Technical excursions to Dutch mine works, refineries, fuel laboratories, and other points of interest will supplement the conference.

ASSOCIATIONS

Headliner

Industry prepares for top convention in Cleveland next month

TYING in with the greatest national coordinated promotional program in the industry's history, the 29th annual convention of the American Gas Association next month will have as its theme "Gas Has Got It." The convention will be held in the Cleveland (Ohio) Auditorium, Oct. 6-8.

AGA

R. H. Hargrove, association president and recently-elected president of the Texas Eastern Transmission Co., will preside and deliver the presidential address at the opening session.

After the official welcome to Cleveland by Mayor Thomas A. Burke, the convention will hear an address on one of the nation's foremost production problems, the supply of steel and its allocation. The speaker on this subject, C. M. White, president of Republic Steel Corp., will direct his remarks to the specific requirements of the gas industry.

Also part of the initial session will be a report of the AGA managing director, H. Carl Wolf; an accounting of the association's financial position by Treasurer Edward F. Barrett, and the election of officers for next year.

Tuesday will be R. W. Gallagher Day, in honor of the former AGA president and first chairman of the Laboratories' Managing Committee. For the morning it is planned tentatively to secure a notable feminine speaker to inform the predominantly male audience on the foibles of America's No. 1 customer. Another speaker will deal with stockholder reports and stockholder attitudes.

Nelson Lee Smith, chairman of the Federal Power Commission, will address the convention on the problem of natural gas industry regulation. Another government representative, Max W. Ball, director, Oil and Gas Division, Department of the Interior, is slated to address the Natural Gas Department meeting later in the day on the activities of his division. Conservation of natural resources is expected to be a major point in his presentation.

D. P. O'Keefe, GAMA president, in an address on "The Responsibilities of Increased Production," will discuss the material situation.

J. J. Quinn, vice president, Boston Consolidated Gas Co., will open the final general session, Wednesday morning, with the keynote speech "Gas Has Got It." Quinn is chairman of the AGA National Advertising Copy Committee.

In a canvass of things to come, an executive of a multi-million dollar enterprise which promises an exciting future for the coal industry, and for the gas industry, is expected to describe the prospective rise of a brand new industry based on coal as a chemical raw material.

Frank H. Adams, president, Surface Combustion Corp., will discuss industry-wide cooperation, with special sidelights on the house heating situation. As part of this session a leading banker will analyze the investment opportunities in the gas industry as viewed by the public generally. Results of the comprehensive gas industry Promotion and Research Plan to date will be outlined in the closing event.

Meetings have been arranged as follows:

Monday afternoon, Oct. 6—Residential Gas Section, Technical Section and Accounting Section.

Tuesday afternoon, Oct. 7—Natural Gas Department, Industrial and Commercial Gas Section, Manufactured Gas Department, Technical Section, and Accounting Section.

Wednesday afternoon, Oct. 8—Accounting Section and Technical Section.

The Home Service Roundtable will be held at the Hotel Statler under the sponsorship of the Home Service Committee, Mrs. Mary Belle Burnett, chairman.

Personnel

Employee relations conference planned

An employee relations conference for the entire gas industry, to be held at the Adolphus hotel, Dallas, Nov. 19-20, was given impetus when the AGA Personnel Committee, meeting in Cincinnati July 16, agreed to join with the Southwest and Midwest Conferences in putting it over.

For the Personnel Committee, Fred R. Rauch of the Cincinnati Gas & Electric Co., will lend his organizational ability to a three-man committee charged with program arrangements. Chairmen of the regional conferences, the Midwest's D. L. Sedgwick, Kansas Power & Light Co., and the Southwest's W. H. Senyard, Louisiana Power & Light Co., are the other members of the group.

Other business handled at the July meeting:

Discussion of psychological tests in the selection of employees, led by C. E. Jurgeson, Minneapolis Gas Light Co.

Appointment of a subcommittee on employee training, consisting of L. A. Brandt, Peoples Gas Light & Coke Co., chairman; G. W. Fewkes, Philadelphia Electric Co.; J. E. Heyke, Jr., Brooklyn Union Gas Co. This group will facilitate handling of the duties of acting as a clearing house for employee training activities, a task which has been delegated to the committee by the Executive Committee of the AGA.

At the July 16 meeting of the AGA Personnel Committee in Cincinnati. SEATED, (left to right): J. E. Heyke, Jr., Brooklyn; L. A. Brandt, Chicago; C. B. Boulet, Sheboygan; L. M. Ayers, Chicago; Fred R. Rauch, Cincinnati, chairman; K. R. Boyes, AGA; W. H. Senyard, New Orleans; J. P. Flemming, Ebasco; H. S. Richmond, Jackson; C. E. Jurgenson, Minneapolis. STANDING: W. L. Haight, Racine; E. J. Brill, Allentown; A. J. Haswell, Tulsa; G. W. Fewkes, Philadelphia; C. D. Magruder, Washington; E. G. Huck, Cincinnati.

A G A Notes

Burner Design Bulletin. Research Bulletin No. 10, "Research in Fundamentals of Atmospheric Gas Burner Design," has been reprinted and is again available from the AGA Testing Laboratories. First issued in 1940, the original printing of the bulletin became exhausted some time ago, but demand from gas appliance and gas company engineers has continued.

Consisting of nearly 200 pages, the issue provides burner design data on ranges and water heaters presented in previous bulletins, besides original work, thus bringing together in one publication extensive information on burner design. While the data presented cover primarily burners of the type commonly employed on gas ranges and water heaters, in many respects they are applicable to atmospheric burners used on nearly all types of domestic appliances. The price: $2 per copy.

Gas Glow Tube Study. To determine the usefulness of small diameter high-temperature gas glow tubes and to chart design information and performance characteristics for such tubes under severe high temperature conditions, a study has been initiated by the AGA Testing Laboratories under the sponsorship of the Committee on Industrial and Commercial Gas Research. Ralph L. Manier of Syracuse, N. Y., is committee chairman.

An experimental furnace, tubular in design and about 5 ft. long, has been installed at the laboratories. Silicon carbide tubes of 3-in. inside diameter and smaller size are being employed in the investigation for constant test data.

Both the furnace and the tubes are fabricated in sections so both the length and size of tubes may be varied. The furnace is being equipped with platinum-rhodium thermocouples for measurement of tube temperatures as well as suitable instrumentation for measuring gas and air flows, pressures, and other data.

While the gas industry has used small size immersion tubes and small size radiant tubes (up to 1800°) there have been no small size tubes for high temperatures (up to 2600°) available. This project is designed to fill that gap.

Purity Meter Patented. A U. S. patent has been granted on a gas purity testing device developed by Earl J. Weber in the course of AGA Testing Laboratory war work. The purity meter has been assigned to the association, and with minor modifications it may help solve some of the problems encountered in the analysis of gases. During the course of laboratories war work a score of separate devices and meters were designed and developed for the army, navy, the office of scientific research and development, and such organizations as the Aero-medical Laboratory at Wright field.

Atom Man Joins Lab. Melvin S. Rubin, a June graduate of Case Institute of Technology and engineer formerly connected with the government's atom bomb plants, has joined the staff of the AGA Testing Laboratories, and has been assigned to the testing department in Cleveland. Entering the army before graduation, Rubin was assigned to the Engineering corps and worked with the Tennessee-Eastman Corp. at the Oak Ridge plant on the processing of uranium isotypes. He was associated with the Oak Ridge plant for 20 months and then was assigned to Army Intelligence at the New Mexico plant.

Summer-Winter Survey. A field survey, summarizing opinions of customers, utility men, and gas equipment manufacturers concerning the summer-winter hookup for supplying year-round hot water service by means of a gas-fired house heating boiler has been published by the AGA Testing Laboratories as Research Report 1060-B.

At the June 5 meeting of the AGA Purging Committee in New York. SEATED (left to right): Jesse S. Yeaw, Rochester; A. D. Harrison, Brooklyn, chairman; H. E. Ferguson, Chicago. STANDING: C. J. Smith, New York; A. Gordon King, New York, secretary; H. S. Carpenter, Newark; G. R. King, Philadelphia; A. E. Wastie, New York; and Gus Chabre, Los Angeles.

"Gas Has Got It"

Gas utilities officials and dealers will soon see previews of what the public is going to see in the "Gas Has Got It" promotional program this fall. The AGA has scheduled 11 regional meetings to familiarize gas men with the scope and details of the greatest coordinated campaign in AGA history.

The first meeting will take place Aug. 20, with the other 10 meetings running from Sept. 2 to Sept. 10. The last of these will precede by 10 days the firing of the opening shot in the drive.

Previews are scheduled as follows:

Aug. 20—Old Heidelberg Hotel, Jackson, Miss.
Chairman: Carl H. Horne, Alabama Gas Co., Birmingham.

Sept. 2—Portland (Ore.) Gas & Coke Co., auditorium.
Chairman: R. G. Barnett, Portland Gas & Coke Co.
Nicollet Hotel, Minneapolis, Minn.
Chairman: W. L. Hayes, Montana - Dakota Utilities Co., Minneapolis.

Sept. 3—Biltmore Hotel, New York.
Chairman: C. S. Stackpole, Consolidated Gas, Electric, Light & Power Co., Baltimore, Md.

Sept. 4—Statler Hotel, Boston.
Chairman: Jack Hiller, Portland (Maine) Gas Light Co.
Congress Hotel, Chicago.
Chairman: H. D. Valentine, Peoples Gas Light & Coke Co.

Sept. 5—Pacific Gas & Electric Co. auditorium, San Francisco.
Chairman: H. A. Lee, P. G. & E.

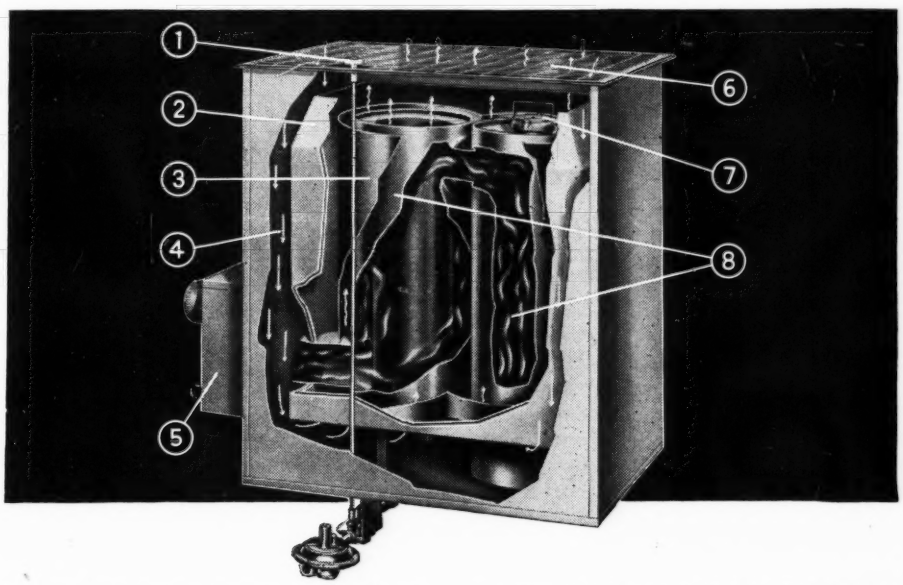
Sept. 8—Adolphus Hotel, Dallas.
Chairman: J. R. Guidroz, New Orleans Pub. Serv. Co., New Orleans.
Hotel Muehlbach, Kansas City, Mo.
Chairman: G. D. Wells, Gas Service Co., Topeka, Kan.
Southern California Gas Co. auditorium, Los Angeles.
Chairman: F. M. Banks, So. Cal. Gas Co.

Sept. 10—Henry Grady Hotel, Atlanta, Ga.
Chairman: J. W. Lea, Atlanta Gas Light Co.

To help you increase the *acceptance of gas* in your area

THE efficient, economical operation of American-Standard Gas Fired Heating Equipment does much toward increasing the acceptance of gas as a heating fuel.

For example, the **SAGINAW FLOOR FURNACE**—expertly designed to provide clean, pleasant warmth. Burns natural, manufactured, mixed, or liquefied petroleum gas. Large, unrestricted return air and warm air passages permit maximum air circulation through the unit, resulting in quick heating and fuel economy. Return air acts as insulator to keep outer jacket cool. Large surface radiator absorbs maximum heat from hot gases before they enter flue. Combustion chamber made of durable steel, with all seams welded leakproof. Fits snugly against floor, supported by flanges at the top. Shipped completely assembled for quick and easy installation. Complies with National Safety requirements approved by American Gas Association.



1. CONVENIENT MANUAL CONTROL—removable key easily operates main burner and pilot valve through register face. Automatic controls available at slight extra cost.

2. SEPARATION CASING—prevents overheating of return air passage, thus improving air circulation and reducing outer casing temperature. Easily removable, thus making inside of furnace accessible for cleaning.

3. BAFFLE—absorbs radiated heat from heating element and presents additional heating surface to the circulated air.

4. RETURN AIR PASSAGE—correctly proportioned to insure unrestricted flow of air from the floor through the unit.

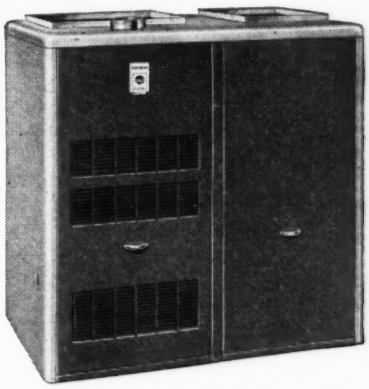
5. DRAFT HOOD — expertly designed to provide proper draft control and protection to burner against down draft.

6. REGISTER — easily removable. Sturdily constructed of fabricated steel with enamel finish.

7. OBSERVATION PORT — for observing pilot and main burner flame.

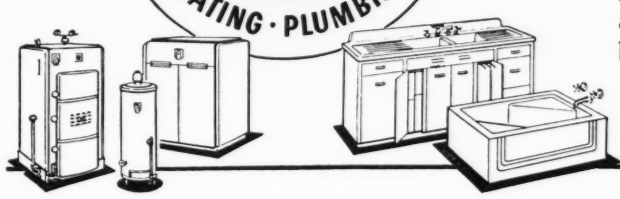
8. COMBUSTION CHAMBER AND RADIATOR—fabricated from heavy gauge steel with all seams welded for permanent tightness. Ample surface enables greatest amount of heat to be absorbed from flue gases before they enter chimney. Adequate height gives necessary thermal heat for superior air circulation.

MOHAWK Winter Air Conditioner. Finest quality materials and precise workmanship throughout result in a unit that gives exceptionally long and dependable service in homes of virtually any size. Has scientifically designed cast iron corrugated ribbon burner . . . rugged cast iron sectional heating element, with each section composed of two parts joined by precision ground faces and asbestos packed, leak-proof joints. Carefully planned for easy erection. Complies with National Safety requirements approved by American Gas Association.



SENECA Winter Air Conditioner. Provides quality low cost winter air conditioning for small and medium sized homes. Copper bearing steel heating element resists corrosion and rust. Complete utilization of large radiator surface effected by strategically placed baffles. Convenient radiator clean-out plates are readily accessible through special openings in a jacket. Complies with National Safety requirements approved by American Gas Association.

AMERICAN-Standard
HEATING · PLUMBING



You can recommend American-Standard Gas Fired Heating Equipment with confidence. **American Radiator & Standard Sanitary Corporation**, P. O. Box 1226, Pittsburgh 30, Pennsylvania.

Serving the Nations' Health and Comfort

LOOK FOR THIS MARK OF MERIT—It identifies the world's largest line of Heating and Plumbing Products for every use . . . including Boilers, Warm Air Furnaces, Winter Air Conditioners, Water Heaters, for all fuels—Radiators, Convectors, Enclosures—Gas and Oil Burners—Heating Accessories—Bathtubs, Water Closets, Lavatories, Kitchen Sinks, Laundry Trays, Brass Trim—and specialized products for Hospitals, Hotels, Schools, Ships, and Railroads.

Jersey Meet

State group schedules 32nd annual conference

DEVELOPMENT of capable leaders in companies, service to the customer, and the problem of house heating will be among the subjects at the 32nd annual meeting of the New Jersey Gas Association in the Terrace Room of the Stacy-Trent Hotel, Trenton, N. J., Tuesday, Sept. 23. This will be the first annual meeting since 1940 to which the entire membership of the association has been invited.

The tentative program includes the following talks: "Servicing the Public —Its Obligation and Reward," by Dr. James Lee Ellenwood, executive secretary, New York State Y.M.C.A.; "We All Meet the Customer," by Henry R. Flanagan, Customer Service Department, Philadelphia Electric Co.; and "What to Do About House Heating," by Robert E. Ginna, vice president, Rochester (N. Y.) Gas and Electric Corp.

Dr. Ralph L. Lee of the Public Relations Department, General Motors Corp., Detroit, will discuss "Leadership and What It Takes."

In a talk entitled "Deal in the Dealer," Bernard A. Seiple, president, Jersey Central Appliance Co., Asbury Park, will tell what the gas company expects from the dealer and what the dealer expects from the gas company. Mr. Seiple formerly was vice president of the Jersey Central Power and Light Co.

Preston D. Gardner, president of the association, will open the meeting with a discussion of the organization's year.

Under the topic "The Gas Industry Looks to the Future," John W. West, Jr., assistant managing director of the American Gas Association, will tell how recent research programs in production, distribution, and utilization will brighten future horizons.

The meeting will last one day, concluding about 4:30 in the afternoon.

Management Day

Celebration of the first American Management Day with an assemblage of 20,000 at the Hollywood Bowl will culminate the 24th Annual Convention of the National Association of Foremen to be held in Los Angeles, Sept. 18-20.

A complete program of speakers, conducted plant tours, 65 industrial exhibits, and a number of entertainment features are scheduled among convention events.

A representative of a gas utilities manufacturer will lead one of the discussion meetings and several gas men are serving on the convention's Industrial Reference Committee, planning the convention. F. S. Cornell, assistant to the president of A. O. Smith Corp., Milwaukee, is the scheduled leader of a panel on "A Practical Approach to Executive Development."

Gas industry members of the reference committee are: T. T. Arden, executive vice president, Grayson Controls Division, Robertshaw Thermostat Co.; Earl Dunn, executive vice president, Fluor Corp.; E. P. Hamilton, president, Hamilton Manufacturing Co.; Paul B. McKee, president, Portland Gas & Coke Co.; F. T. Parks, vice president, Public Service Co. of Colorado; Louis Ruthenburg, president of Servel Inc. and past president of the National Association of Foremen: and Guy W. Wadsworth Jr., vice president, Southern California Gas Co.

Midwest Gas School

Joint sectional meetings will follow general sessions at the 24th Annual Gas School and Conference to be conducted Sept. 8-9 by the Mid-West Gas Association and Engineering Extension Service of Iowa State College. The conference and accompanying exhibits will be held at Ames, Iowa.

Subjects at joint meetings of distribution, utilization, production, and meters and metering sections on Tuesday will be "Peak Shaving in Production," "Methods in Changing from 600-Btu Mixed Gas to Straight Natural Gas," "Peak Shaving in Utilization," and "Experiences of a Recently Completed Change-Over."

At the general session on Monday, addresses are scheduled on "The Current Situation in the Natural Gas Industry," by John F. Merriam, vice president and treasurer, Northern Natural Gas Co., Omaha, and on "Weather Forecasting for the Gas Industry," by H. C. S. Thom, senior meterologist, U. S. Weather Bureau, Des Moines, Iowa.

IPAA Annual Meeting

Oklahoma oil producers will meet with operators of other areas of the nation in the 18th Annual Meeting of the Independent Petroleum Association of America to be held Sept. 29-30 in Oklahoma City. Committees of the association will hold pre-meeting sessions to review their activities of the past year and to prepare reports for presentation to the general membership meeting.

CALENDAR

September

American Society of Mechanical Engineers, Fall Meeting—Salt Lake City, Utah, Sept. 1-4.

Mid-West Gas Association Annual Gas School and Conference—Ames, Iowa, Sept. 8-10.

Southwest Personnel Conference—Mayo Hotel, Tulsa, Okla., Sept. 10.

Midwest Personnel Conference—Antlers Hotel, Colorado Springs, Colo., Sept. 12.

Gas Division, Oklahoma Utilities Association—Biltmore Hotel, Oklahoma City, Okla., Sept. 19.

New Jersey Gas Association—Stacy-Trent Hotel, Trenton, N. J., Sept. 23.

Pacific Coast Gas Association 1947 Convention—Coronado, Calif., Sept. 23-25.

October

International Gas Union—Lausanne, Switzerland, Oct. 3.

American Gas Association Annual Convention—Cleveland, Ohio, Oct. 6-8.

National Safety Congress and Exposition—Chicago, Oct. 6-10.

Texas Mid-Continent Oil and Gas Association—Gunter Hotel, San Antonio, Oct. 16-17.

National Metal Congress and Exposition—Amphitheater, Chicago, Oct. 20-24.

American Standards Association—Waldorf-Astoria, New York, N. Y., Oct. 21-23.

November

National Hotel Exposition—Grand Central Palace, New York, N. Y., Nov. 10-14.

Employee Relations Conference—Adolphus Hotel, Dallas, Texas, Nov. 19-20.

December

American Society of Mechanical Engineers Annual Meeting—Dec. 1-5.

February, 1948

8th International Heating & Venting Exposition—Grand Central Palace, New York, N. Y., Feb. 2-6.

March

New England Gas Association—March 18-19.

Southern Gas Association—March 24-25.

Mid-West Regional Gas Sales Conference—Edgewater Beach Hotel, Chicago, March 29-31.

EXPANSION

Tapping the Inches

Lines' input will be stepped up to 340 MMcf per day to accommodate newcomers

GAS utilities and Texas Eastern Transmission Corp., with assists from the Federal Power Commission, last month were progressing nicely on plans to use the Big and Little Inch line to cut into the impending winter "gas shortage." At least three companies were moving to increase the capacity of facilities designed to take gas from the Inches, and one other was seeking permission to cut in on the lines. Texas Eastern, Inch operators, meanwhile were making public plans to increase the input to 340 MMcf a day by January—a figure well over twice the present carry.

Takers:

United Natural Gas Co. The FPC authorized this company to construct 71 miles of 20-in. line in Pennsylvania. Costing $3.3 million, the addition will hook the south end of United's 12-in. line in Franklin county, Pa., to the Inch lines in Rich Hill township, Greene county. United furnished gas to communities in western and northwestern Pennsylvania and a small portion of Ohio.

New York State Natural Gas Corp. The FPC authorized construction of additions to the company's transmission and storage lines to increase deliveries to customers in Pennsylvania and New York. At an aggregate cost of $5,342,366, the company will go ahead with two projects—one to be completed by Dec. 1, 1947, the other by Dec. 1, 1948. Both jobs will enable New York State Natural to increase volumes received from the Inches and from Hope Natural Gas Co.

The first facilities to be built will include a 90-mile loop line along the existing line in Armstrong and McKean counties, with 35 miles of 12¾-in. line and 55 miles of 14-in. Added to this will be three 300-hp. and three 600-hp. compressors at Boom station in Tioga county. Net result: increase of capacity to 90 MMcf.

The 1948 program: construction of additional looping, including 24.5 miles of 16-in. loop, 24 miles of 14-in. loop, 13.4 miles of 16-in. loop. This project will add 20 million more, giving New York State Natural a delivery capacity of 110 MMcf.

Petitioners:

East Ohio Gas Co. The FPC has

been petitioned to issue a permit for construction of 84 miles of 20-in. line in Ohio to enable the company to receive a proposed increased delivery. Cost of the project is estimated at $3.2 million. East Ohio, which supplies 83 Ohio cities with gas, is at present taking 47 MMcf daily.

Philadelphia Gas Works. This city-owned company wants 50 million feet of Inch gas by late 1948, with a possible later increase to 80 MMcf, for mixing with manufactured gas.

Meanwhile, Alec Crowell, engineer in charge of natural gas purchases, has revealed that Texas Eastern will have a buyer's option for 450 MMcf of gas at a pressure base of 15.025 psi. The company has 12 firm gas purchase contracts, representing purchases of 406,300 Mcf per day at a pressure base of 16.7 psi. In addition, there are seven contracts pending for a total of 234 MMcf daily at a pressure base of 16.7 psi. Recoverable reserves of 2,720 billion cubic feet (at 16.7 psi) are represented by the company's 12 firm contracts.

Capacity Boosted

FPC authorizes TGT to increase delivery from 381 MMcf to 600 MMcf

THE FPC has authorized Tennessee Gas Transmission Co. to construct and operate pipe line facilities designed to increase the delivery capacity of its system from 381 MMcf to 600 MMcf daily. Overall cost of construction would approximate $53,542,835. The commission stated that the record shows a public need, demand and market for the increased volume of gas proposed to be supplied by TGT.

Authorized facilities include construction of 491½ miles of 26-in. loop, 69 miles of 24-in., 165 miles of 20-in. and 16½ miles of 6⅝-in. line. A new compressor station with 4000 hp installed will be built, and an additional 73,400 hp will be added to existing or authorized compressor stations. An aerial suspension bridge pipe line crossing over the Mississippi river will be made near Greenville, Miss. The accompanying map shows an 83-mile, 20-in. lateral line which is part of the program. It will carry gas already contracted for from three new large producers in the Carthage field.

Conditions contained in the order provide that TGT shall make available increasing volumes of gas so that upon completion of facilities having a capacity of 381 MMcf per day, Louisville Gas and Electric Co. will receive an aggregate of 20 MMcf daily and Kentucky Natural Gas Corp. 15 MMcf. Deliveries from the lines, however, are to be made proportionately with other customers being served. Although TGT proposed to deliver only 15 and 6 MMcf per day, respectively, to Louisville Gas and Electric and Kentucky Natural when its capacity should reach 381 MMcf daily, evidence showed that the companies had need for substantial additional volumes and that the facilities were orginally authorized in part on the basis of the needs of these two intervenors. The commission deemed that TGT should make available the required quantities to these companies.

The commission conditioned its order that the facilities authorized shall not be used for the transportation or sale of natural gas to any new customers except upon specific FPC authorization, and until further order, shall not be used for the transportation or sale of gas for which there were presented no firm purchase commitments.

Texas Supply

PG&E contracts with Southern California gas companies for new load

AN agreement whereby Southern California and Southern Counties Gas Co.'s will sell up to 100 MMcf per day to Pacific Gas & Electric Co., San Francisco, will enable Southern California to benefit from the introduction of Texas gas to a fuller extent during the next three years—if the contract is approved by the California Public Utilities Commission.

(The contract was being heard by the commission as GAS went to press, Aug. 21. It was generally conceded that it would be given the commis-

sion's blessing, because of the apparent benefits it would bring to both sections of the state.)

In effect, the plan would step up by three years attainment of the maximum amount of gas to be delivered from Texas through the "Biggest Inch" pipe line now under construction. Originally scheduled on a sliding scale, deliveries were not to reach the 305-MMcf per day maximum until 1952; but the sale of gas to northern California will make possible the introduction of 175 MMcf in 1948 and an increase to the full 305 MMcf in January, 1949.

Thus southern California will not have to wait until a load is built up to take extra amounts of gas, and will have an outlet for volumes that exceed local requirements; also, there will be more gas at hand for peak loads. Furthermore, the two Los Angeles companies will be able to pay off the cost of the huge investment much sooner than planned.

Highlights of the contract:

PG&E will receive, not later than April 1, 1948, guaranteed daily deliveries of 50 MMcf from the southern companies' source of supply in the San Joaquin valley, where the systems are more or less contiguous. After southern interruptible customers are accommodated, the company will also receive an additional 25 MMcf. The plan is to continue in effect until Sept. 30, 1953, at which time the southern companies will absorb the entire additional load of 305 MMcf.

Heavy withdrawals of gas from northern fields will also be alleviated for a period of time which may enable PG&E to find additional sources of supply.

Price of the gas will equal cost of Texas gas delivered at the border plus 5 cents at one point of delivery and 6 cents at the other.

LP-Gas in Canada

Possibilities of propane and other LP-Gases for handling peak loads and unusual supply conditions are being investigated by a number of Canadian cities and towns now served with manufactured coal and water gas.

The city of Brockville, Ont., has a plant under construction to supply propane-air gas to its citizens. The old water gas plant will be discontinued.

The Sherbrooke, Que., electricity and gas departments, another municipal coal gas works, will close down as soon as a new propane-air gas plant is built. A contract for a complete new plant has been let to the Pacific Gas Corp., New York, at a figure of approximately $137,000.

The City Gas & Electric Corp., Ltd., of Three Rivers, Quebec, has decided to change over its butane-air gas plant to propane-air as soon as the change can be made. The contract has been let to Salem Engineering (Canada) Limited, of Toronto.

Guelph, Ont., through its municipally-owned gas plant, has contracted through the Brantford (Ont.) Manufacturing & Engineering Co. for a complete standby propane-air gas works, which will be used to take care of peak load conditions on the regular coal gas works, especially during the cold months.

Bottling plants are being erected by one Canadian oil company, at Stratford, Maple and Carleton Place, in Ontario, where bottled propane gas will be supplied to rural and other customers not located on regular gas works distribution lines. Owen Sound may shortly shut down its coal gas plant and, through a private company, go into the sale of bottled propane gas.

Other cities becoming interested in the use of propane-air gas possibilities include Kitchener and Peterborough, Ont.

Add to Arizona Supply

El Paso (Texas) Natural Gas Co. has requested FPC authorization to expand its pipe line facilities to enable it to supply up to an additional 20 MMcf daily to Phoenix and Tucson, Ariz. The company stated that it expected to have the necessary pipe, compressors and other equipment in time to begin construction on Nov. 15. Cost of the project was estimated at $3,323,000.

Facilities proposed include about 103 miles of line, varying from 4½-in. to 26-in., as well as solid dehydration and gas purification plants and installation of an aggregate of 7600 hp in existing compressor stations and appurtenant equipment.

Gas supplies will come from residue gas in the Permian Basin now being flared, the firm stated.

$12 Million Program

Chester L. May, vice president of Lone Star Gas Co., Dallas, has announced a $12 million expansion program for the coming year for the system which serves 325 communities extending from Norman, Okla., to Austin, Texas. Population increase has necessitated this expansion, with $1 million scheduled for expenditure in the Fort Worth area where the metropolitan population has almost doubled since 1941. The program will include installation of facilities to serve more towns, and construction of recycling plants, main lines, distribution systems and compressor stations. Another innovation is the organization of a kitchen planning center for the Fort Worth Division.

Lone Star has installed 5000 additional meters this year, 4500 in Fort Worth proper, and installations are expected to be more rapid during the rest of the year.

Cities Service Gas Co. Extension

The FPC has granted temporary authorization to Cities Service Gas Co., Oklahoma City, to construct and operate 10½ miles of 16-in. pipe line in Grady county, Okla., to be operated as an extension of part of its southern system, and an additional 15.6 miles of 16-in. line to increase system capacity on the outlet side of its Tallant compressor station, also in Oklahoma.

These facilities comprise part of an emergency construction plan proposed by the company to build up supply on its southern system so that the anticipated demand for gas can be met during the next two years. This plan is an alternative to its proposed supply line to the Hugoton field for which the firm was unable to obtain the necessary pipe.

TGT Adds Facilities

To enable Hope Natural Gas Co. to receive from Tennessee Gas Transmission Co. an additional 50 MMcf daily, increasing to 165 MMcf per day the company's capacity to take gas from TGT, the FPC has approved construction of four 1000-hp compressor units, a 6000-hp booster station and 31 miles of pipe line in West Virginia. The additional gas is to be transmitted to The East Ohio Gas Co., The Peoples Natural Gas Co., The River Gas Co. and New York State Natural Gas Corp.

Cost has been estimated at $3,004,507, which will be financed from cash resources augmented by the sale of additional capital stock to Hope's parent company, Consolidated Natural Gas Co.

Panhandle Plans New Capacity

The FPC has set hearing for Sept. 15 in Washington, D. C., on an application filed by Panhandle Eastern Pipe Line Co. for authority to construct facilities designated as "Group C." Designed to raise the firm's delivery ca-

NATURAL GAS *is working for you at new* LOW COST!

HAPPY DAZE
When Your home has a real FAMILY-SIZE Automatic GAS water heater
When Johnny dawdles neck deep in a steaming tub bath, he is using from
GAS HEAT
FOR WINTER COMFORT
Taking it easy with house heating is one of the big
asons why life is better in California. No work or
uble tending a fire, no muss and fuss or ordering
uel and worrying about price or delivery.
With gas heating you can relax and enjoy
rtable, trouble-free, unif
hour after
hour, day after day. And yet with all this luxurious
convenience gas heating is by no means costly. On
the contrary, it is the most economical fuel to use.
If you are planning to remodel or build a home
insist
system
Planning to Build this Summ
When you are making plans for a new home or for the rem
elling of your present home, be "fussy" about the capacity
your gas furnace and the location of the heat outlets, the c
air return and the wall thermostat. This is most import
STAYS SILENT, LASTS LONGER
Great New
1947 GAS
Refrigerator
MEET THE GAS FLAME FAMILY
Step Forth in '46 to New Freedom ...more fun
ng to reconvert your
ling-up" the kind of
e in your new home?
tchen to look smart
nt. You will want a
ge and Refrigerator,
r the sink or food
ve steps, time and
men have fallen in
designs called the
tchen." Your gas
anufacturers have

Helping Promote Better Living

Samples of advertising published by P. G. and E. in Northern and Central California newspapers during 1947 to help promote Better Living with GAS.

P. G. and E. PACIFIC GAS AND ELECTRIC COMPANY

pacity to about 580 MMcf per day, facilities include 356 miles of 26-in. loops and installation of an aggregate of 37,600 hp in existing compressor stations. Cost of the construction was estimated at $23,464,000. Facilities previously authorized were designed to increase Panhandle's capacity to about 473 MMcf daily.

Kentucky Natural to Meet Peak

Facilities to be constructed by Central Kentucky Natural Gas Co., to be used for additional deliveries of natural gas to The Cincinnati Gas & Electric Co. and The Union Light, Heat & Power Co. to meet peak day requirements for the coming winter, have been temporarily authorized by the FPC. Cost is estimated at $1,933,000.

Construction is to include 23.2 miles of 24-in. line extending from near Foster, Ky., to a point on the Ohio River near Brent, Ky., and multiple crossings of the Ohio River to connect with pipe lines of the Cincinnati company. A new measuring station at Cold Spring, Ky., was also approved.

Chicago Co. Leases Lines

FPC authority has been received by Chicago District Pipeline Co. to acquire by lease and to operate extensions of its Crawford and Calumet lines and specified connecting laterals now owned and operated by The Peoples Gas Light and Coke Co. The lease will be for the term of one year and from month to month thereafter.

Facilities to be leased include a 20-in. and a 24-in. pipe line near Chicago, together with regulating and metering facilities, and two lateral lines to delivery points to Northern Indiana Public Service Co. on the Illinois-Indiana state line.

CG&E Plans for Peak

Cincinnati Gas & Electric Co. has completed plans for new facilities in both the gas distribution and gas production departments. The program will cost about $500,000. The firm expects a substantial increase in its peak load this coming winter, even with present curtailments on installation of heating equipment. Central Kentucky Natural Gas Co., one of CG&E's suppliers, will construct a 24-in. line from Foster, Ky., to a point near Cincinnati.

Conversion to Natural Gas

The $500,000 job of converting gas appliances throughout the Syracuse, N. Y., area to straight natural gas is now under way, John L. Haley, president of Central New York Power Corp., has announced. Field crews, eventually totaling about 250 men, will work through the next three months

to adjust every gas burning appliance used by 75,000 customers in Syracuse, Oswego, Fulton, Baldwinsville and adjacent communities.

REGULATION

Rate Reduction

Customers relieved of $856,000 load in new TGT agreement on schedule

The FPC has issued an order terminating proceedings involving rates of Tennessee Gas Transmission Co. and allowing new rate schedules filed by the company to become effective as of April 1, 1947. The schedules provide for an annual reduction of approximately $856,000 to the company's customers.

Reductions effected by the rates upon sales of natural gas by Tennessee to its principal customer companies are:

Hope Natural Gas Co.	$254,207
United Fuel Gas Co.	407,529
Louisville Gas & Electric Co.	150,265
Taylor Green Gas Co.	5,599
Kentucky Natural Gas Corp.	34,238
Tennessee Natural Gas Lines, Inc.	4,089

The rate proceedings arose from an investigation instituted by the commission in 1944 to determine whether any rates, charges or classifications demanded or collected by Tennessee in connection with its transportation or sale of natural gas subject to FPC jurisdiction were unjust or preferential. Following the commission's order, the FPC staff made a field investigation of the company's books, records and operations. Upon completion of the investigation, conferences were held between representatives of the commission and Tennessee. Agreement was reached on all issues.

Gas for St. Paul

When Northern Natural Gas Co.'s system sales capacity reaches 390 MMcf (but not before April 1, 1948), the company will be allowed to deliver to Northern States Power Co. the volumes of natural gas necessary for distribution of straight natural gas in the St. Paul, Minn., area, provided such deliveries are limited to 4 MMcf at such times as Northern Natural requires additional gas to protect firm service to other utility customers. Northern Natural may not begin to supply this additional gas until Northern States has installed facilities to produce sufficient 1000-Btu manufactured gas to insure continuity of service at the times when it receives only 4 MMcf daily.

This recent FPC order is a modification of its order of June 9, authorizing Northern Natural to construct facilities to increase its system capacity to 407 MMcf daily and to sell natural gas to Northern States upon completion of the above facilities. The modification was issued upon consideration of applications for rehearing.

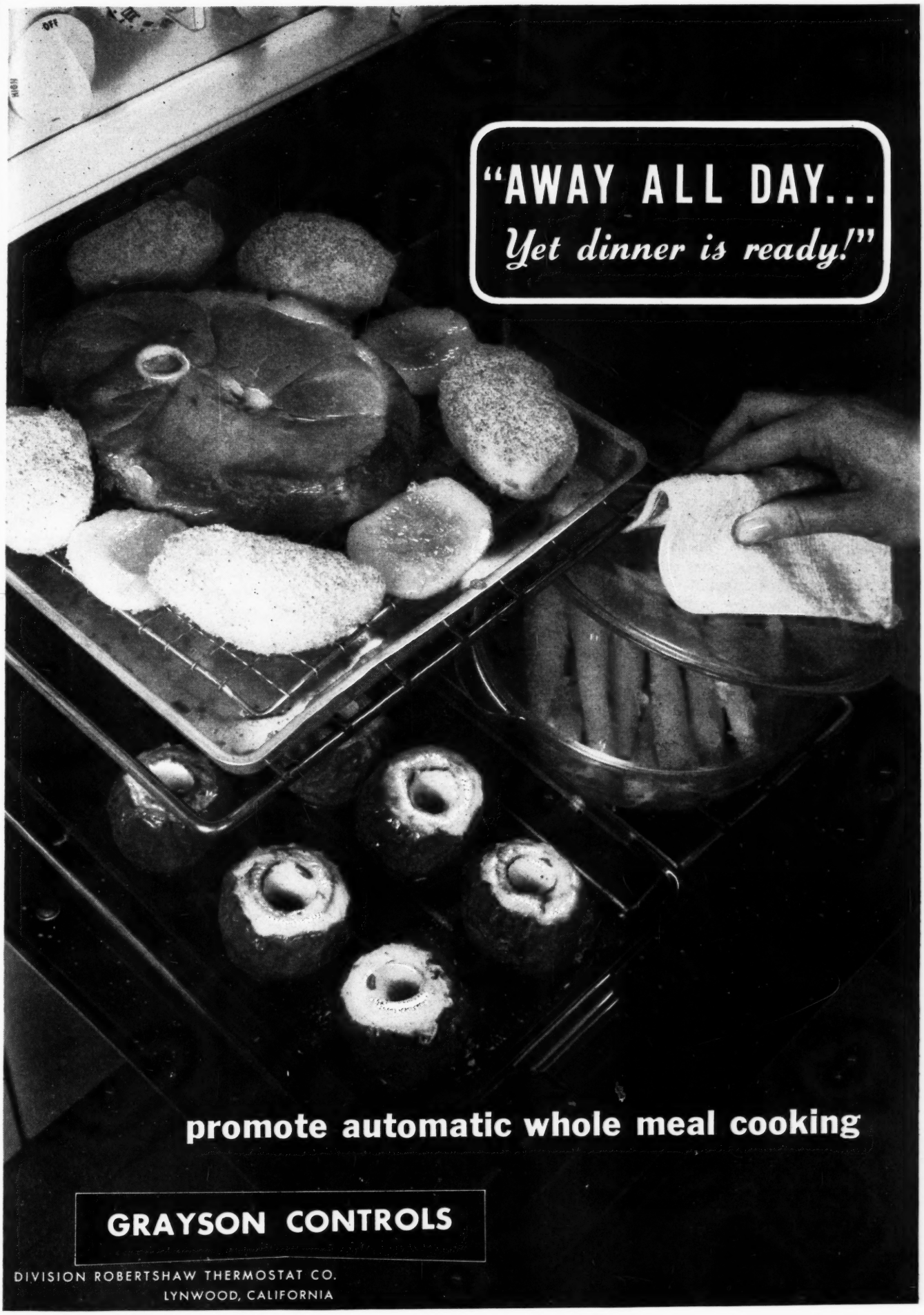
Kansas Wells Shut Down

Early last month the Kansas Corporation Commission ordered that 92 wells in the Kansas portion of the Hugoton field be shut in because of excessive and illegal withdrawals of natural gas. Jeff A. Robertson, chairman, said this was the first time that the commission had invoked its powers to halt production. Hardest hit by the order was Republic Natural Gas Co., Dallas, which was instructed to shut in 63 wells. A telegram to company officials stated that 62 of the wells were over-producing three times the current allowable and that another has an overcharge outstanding against it for more than a year.

Robertson estimated that the 92 wells had exceeded their allowables by a total of between six and seven billion cu. ft. Other companies receiving shut-in orders were White Eagle Oil Co., 14 wells; Cities Service Oil Co., one well; Stanolind Oil & Gas, eight wells; Kansas-Colorado Utilities, Inc., two wells; Northern Natural Gas Co., one well; Texas Co., one well; Panhandle Eastern Pipe Line Co., in conjunction with Saturn Oil & Gas Co., Kansas City, two wells. Robertson said the commission had ordered the wells closed until average charges to each well are fully made up by deductions from current allowables, or until further order.

Hunt Status Settled

The FPC has declared that the producing, gathering, and "arm's length" selling operations of one individual and one company are not subject to federal jurisdiction. Both had applied to the commission for status determination. H. L. Hunt operates two gathering systems—in the Whelan field in Texas and in the Lucky field in Louisiana—and gathers gas purchased from producers at the wellhead. Such gas is dehydrated and sold to Texas Eastern Transmission Corp. The Hassie Hunt Trust operates 13 gas wells in the Northeast Lisbon field in Louisiana and gathers gas from its own wells and from other wells in the


"AWAY ALL DAY...
Yet dinner is ready!"
promote automatic whole meal cooking
GRAYSON CONTROLS
DIVISION ROBERTSHAW THERMOSTAT CO.
LYNWOOD, CALIFORNIA

same field. The gas is sold to Texas Eastern and, after processing, to the Arkansas Louisiana Gas Co.

Oklahoma Appointments

The Oil & Gas conservation department of the Oklahoma Corporation Commission has been reorganized under a new state law which became effective July 1. Under the reorganization Walker T. Pound, previously conservation officer, became director of conservation and Lawrence Alley, former chief clerk, is now assistant director. John Blanton was appointed assistant conservation attorney, and Floyd Green was reappointed conservation attorney.

Other appointments in the department include Massena Murray as assistant director and field supervisor, W. H. Sollers as trial examiner, Neal Addington as court reporter, and Ray Munn as field supervisor.

FPC to be Investigated

The Federal Power Commission is one of at least 13 federal agencies whose fiscal operations will be scrutinized in a detailed, unprecedented investigation to be made during the Congressional recess by experts of the House Appropriations Committee. The purpose of the inquiry, according to Rep. John Taber of New York, chairman of the committee, is to enable the committee to pass intelligently on budget requests for the departments when President Truman submits them to Congress in January.

FINANCIAL

Virginia Rate Case

Richmond mayor's request for rate determining power denied by state commission

The Virginia State Corporation Commission has rejected a renewed request of Mayor Horace H. Edwards of Richmond to allow governments of localities served by the Virginia Electric & Power Co. to be represented in rate negotiations between the company and the state commission. Edwards declared that Vepco earnings in 1946 were 53% higher than those "generally permitted." He stated that Richmond's consumer gas cost, apparently far above the average, is made even greater by the fact that the city council has added a 5% utilities tax which is borne by every resident within its corporate limits.

The mayor pointed out that Richmond's gas charges are established by the city government itself, since the plant is municipally owned, and no taxes are paid on the plant. In a comparison with Charleston, W. Va., Edwards reported that the gas in that city has a value of 1100 Btu per cu. ft. and sells for 29 cents for the first Mcf. Richmond's 530-Btu gas, on the other hand, sells for $1.30 for the first Mcf. (Charleston has one of the lowest gas rates in the country.)

In the meantime, The Philadelphia Electric Co. has told the FPC it is considering raising rates for manufactured gas for house heating in the area surrounding Philadelphia, Wilmington, Del.; Reading, Pa., and Elkton, Md. The current rate will not continue to be profitable, the firm states, if prices of raw materials continue to increase and if they remain difficult to obtain in sufficient quantity to meet the demand. The company is trying to get 20,000 Mcf per day of Big Inch gas.

Basing its decision on the company's need for additional revenue to meet higher taxes, wages and material costs, the New York Public Service Commission recently announced the granting of a temporary increase in The Brooklyn Union Gas Co.'s rates, effective July 28, 1947, to July 1, 1948. The new rates, covering all classifications of Brooklyn Union's 800,000-odd customers, are expected to bring increased revenue of more than $1.8 million.

$2,737,071 Deal

Public Service Co. of Oklahoma requested the Securities and Exchange Commission to approve the proposed sale of all of its gas utility properties to Consolidated Gas Utilities Corp. for a base price of $2,737,071, subject to closing adjustments. Divestment is in compliance with the commission's order of Feb. 16, 1945.

Southern Natural Gas Co. has applied to the SEC for authority to borrow $5 million on its promissory notes from Chase National Bank and certain other banks. Southern stated that it has applied to the FPC for authority to construct additions and extensions to its pipe line system, at a cost of $17.5 million. The application also stated that the company will require a substantial amount of additional funds for its expansion program, and will undertake further financing by the issue of additional securities during 1948.

Income Figures for May

Although composite figures for all companies reporting to the FPC for the month of May show an increase in net income over May, 1946, at least two companies report a decline in net income for the first six months of 1947, as compared with the previous year, despite increased operating revenues.

Seattle Gas Co. reports six-month operating revenues of $1,863,424, an increase of $271,720 over the first half of 1946. Net income, however, totaled $148,201 compared with $191,958 last year. Washington Gas Light Co.'s reported net income for six months of 1947 is $847,588, but the figure stood at $998,613 for the same 1946 period. Operating revenues of $7,617,197 were $429,514 higher than in the first six months of 1946.

Increased operating expenses and taxes were blamed for the decline in net income.

FPC Grants Rate Increase

Panhandle Eastern Pipe Line Co. has received FPC approval of its supplemental rate schedules covering the period from June 1 to Nov. 1, 1947. The request for a rate increase was filed by Panhandle to enable it to recoup from customer companies the difference between the rates at which it would deliver natural gas from its own system if the gas were available, and the rates at which Texas Eastern Transmission Corp. delivers Big Inch gas to Panhandle through the system of The Ohio Fuel Gas Co. The price of Big Inch gas at the point of delivery to Ohio Fuel is 4½ cents more than Ohio Fuel pays for Panhandle gas. The schedules were to become effective retroactively as of June 1, 1947.

New Jersey Companies Merge

Peoples Gas Co. and Atlantic City (N. J.) Gas Co. no longer exist because of the following changes:

On April 7 Peoples Gas Co. was absorbed by and merged into Atlantic City Gas Co. On May 5 the name of Atlantic City Gas Co. was changed to South Jersey Gas Co. and the combined business of the two companies will be carried on under that name.

Sales Increase for June

Sales of natural gas in June rose to 1,848,000,000 therms, according to an AGA report, a gain of 8.9% over June, 1946. Manufactured gas sales for the month stood at 165 million therms, 4.9% more than the previous year. Mixed gas sales advanced 12.3% to total 98 million therms. Total gas utility industry sales for June were 8.7% greater than in June, 1946, and for the 12 months ending June 30, 1947, sales increased 10% over the preceding year.

EMPLOYEE RELATIONS

"No Accident" Safety Campaign

Last month employees of The Manufacturers Light and Heat Co., Pittsburgh, launched their sixth annual "No Accident" safety campaign. President Charles E. Bennett urged a careful check of all unsafe habits, and the company employed group meetings, educational messages, safety posters at strategic locations, reminder buttons and special conferences to drive home the need for this annual drive conducted by Columbia Gas & Electric Corp., with which the company is affiliated.

El Paso Workers Vote Out Union

On May 23 ballots were counted at the sub-office of the National Labor Relations Board, El Paso, Texas, to determine whether or not El Paso Natural Gas Co. employees would affiliate with the Oil Workers International. One hundred sixteen votes were cast against the union, while 86 favored it. In a previous election held in May, 1945, the vote was 51 for the union and 55 against it.

Salaries vs. Living Costs

Effective as of July 1, all employees of Community Public Service Co., Fort Worth, Texas, received salary increases to help offset rising living costs. The bonus involves an increase of 10% to all employees with base salaries of $250 per month or less and a flat increase of $25 per month to employees whose salaries are in excess of $250 per month.

MISCELLANY

Gas From Wood Scrap

City gas from wood scrap may supply Vancouver, B. C., in the future if current investigations by British Columbia Research Council show it to be feasible. The B. C. Electric Railway Co. has provided $2500 for the initial phase of the research program and an equal sum has been contributed by the council.

Successful utilization of sawmill scrap as a source of gas would not only supplement increasingly scarce supplies of coal suitable for gas production, but would also provide a profitable use for the over 3000 cu. yd. of mill scrap which cannot be used for lumber or for domestic fuel and which is now incinerated or dumped daily in the Vancouver area. The utilization of scrap wood and bark has long been a major problem of the lumber industry.

Gas can be produced from wood by several methods; the wood may be heated until it breaks down into gas and charcoal; the charcoal may be partially burned to carbon monoxide with air, or steam may be passed through red hot charcoal to form carbon monoxide and hydrogen. All three processes may be combined, some experiments with the use of wood for gas have already been carried out by B. C. Electric. These indicated that numerous problems remain to be solved before a satisfactory process is developed.

The investigation will be carried out by W. J. Dyck of the council's staff under the direction of Dr. R. H. Wright, head of the Division of Chemistry. Dyck was formerly engaged in fuel research with the Fuel Research Board of the Department of Mines and Resources in Ottawa.

Liquid Fuel Production

The Department of the Interior has reported that conversion of the Missouri Ordnance Works near Louisiana, Mo., from synthetic ammonia to synthetic liquid fuels production is under way again. The $17.5 million plant will serve as a proving ground for processes developed to convert part of this country's immense coal reserves into liquid fuels to supplement our limited petroleum resources.

Late in 1945 the Bureau of Mines began converting the plant, but an extended delay was necessitated when the War Department took it over again for emergency production of ammonia for fertilizers. The bureau recently completed the return transfer of 79 engineering and administrative personnel from Torrance, Calif., to Missouri. Design work continued during the year at Torrance, which is the headquarters for Bechtel Corp., which holds a $6,780,000 contract for engineering, design, and construction necessary under the conversion program. Equipment, grading and housing subcontracts totaling approximately $4 million have been placed. The construction schedule calls for the Missouri plant to be producing gasoline and oil from coal and lignite by June 30, 1948.

Gas Restricted in N. Y.

Because of the continued natural gas shortage and the possibility of trouble a few days this coming winter, the Iroquois Gas Corp. of Buffalo, N. Y., has put into effect more rigid restrictions in space-heating installations.

"The new restrictions," said President Olin F. Flumerfelt, "prohibit the conversion from any other fuels to gas for hardship cases, or the acceptance of applications for any new or additional space heating jobs. This means that only those heating jobs which were contracted for and applications accepted under the provisions of the restrictions filed in November 1946, are eligible for gas heating service when the jobs are completed."

Laclede Gas Light Co., St. Louis, also has announced to its customers that it cannot make any new space heating commitments because of the shortage of gas. The company states that an additional supply of natural gas which it had expected to be available this year will be further delayed because sufficient materials cannot be obtained and installed in time for the coming heating season.

Butadiene Manufacture Halted

Production of butadiene at the Southern California Gas Co. plant which has been turning out this essential ingredient of synthetic rubber since June, 1943, was called to a halt by the Office of Rubber Reserve on July 30. Government officials cited the present high level of natural rubber importations as the reason for the curtailment of the national synthetic rubber program. The gas company was ordered to place the government-owned facilities at the plant "in standby condition for extended non-use."

Some 400 employees, most of whom were hired during the period of butadiene production, were faced with layoff or transfer. Bid notices indicating job vacancies in the firm were posted, allowing displaced employees to bid for a position and receive an interview.

During the four years of operation, the plant produced a total of 85,000 tons of crude butadiene, enough when combined with styrene to furnish rubber for 17 million average size tires. Manufactured gas was formerly produced at the plant to help meet peak demands.

Heat Wave Helps Industry Users

As a result of the heat wave early last month, all industry was "on" for the first time in over two years and curtailment was at a minimum, according to a report from Gas Supply Supervisor R. M. Bauer of Southern California Gas Co., Los Angeles. As the thermometer soared, domestic use of gas decreased sharply, allowing greater volumes for industrial use.

Silicon Carbide Generator Linings

Excerpts from paper presented at the AGA Joint Production and Chemical Committee Conference, New York, June 2-4.

IN conclusion, it may be said that the gas industry is generally adopting the use of silicon carbide for generator linings and, in some instances, the use of this material for lining cross-over connections and for other parts of the water gas set.

This gradual process of acceptance seems warranted in the light of the improvements experience has shown to accompany the installation of silicon carbide linings. The following facts about these linings seem evident from the replies to the questionnaire based upon the users' experiences:

(1) The life of silicon carbide lining is probably four times that of a clay lining.

(2) Repairs to a silicon carbide lining are not required as soon as with clay.

(3) Most of the companies practice patching silicon carbide linings, some as often as three to five times.

(4) On the average of one hour's time and from two to four man-hours per cleaning are saved when a clay lining is replaced by silicon carbide.

(5) Savings in total annual labor costs from reduced clinkering time range chiefly between 20% and 50%. However, most of the savings are reflected in better working conditions and increased set operating hours.

(6) Silicon carbide lining walls are left free after cleaning, while this is not true of clay linings.

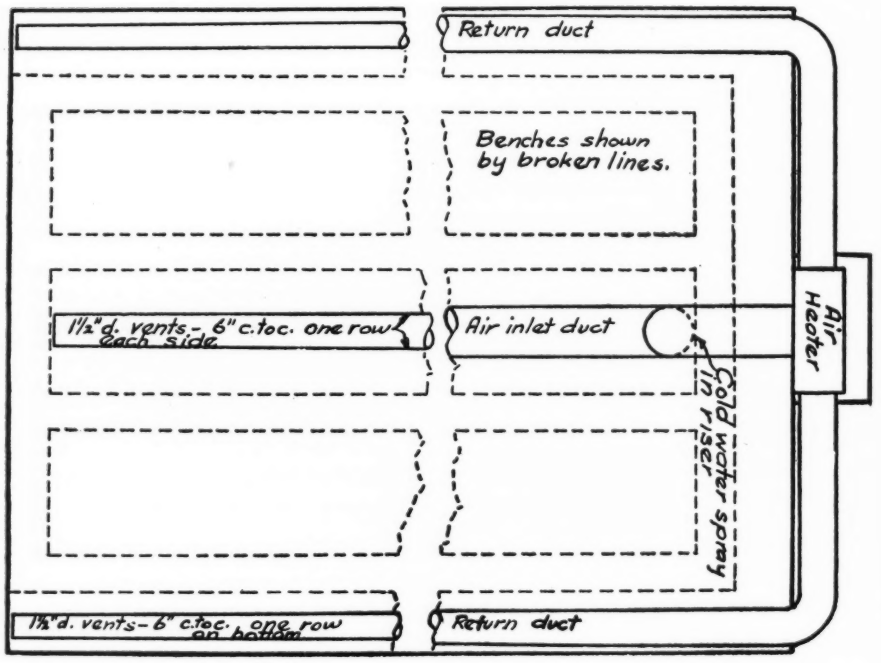
(7) Replies concerning the effect of a silicon carbide lining upon set capacity vary widely. About 40% state no effect while the remaining 60% have experienced an average increase of 10% in set capacity. The type of generator lining, however, seems to be a difficult factor to isolate from so many other influences.

(8) Installation costs are approximately four times as high for silicon carbide as for clay, but the overwhelming majority of the companies feel the results justify this additional cost.

(9) Door openings remain the chief problem for most of the companies involved in this study. A few have adopted water-cooled steel as the solution and have been satisfied. However, extensive further development remains to be done on this subject.

T. A. CORBY

Central Hudson Gas & Electric Corp., Poughkeepsie, N. Y.


Return duct
Benches shown by broken lines.
1½"d. vents - 6" c.toc. one row each side
Air inlet duct
Air Heater
Cold water spray
Riser
1½"d. vents - 6" c.toc. one row on bottom
Return duct

A gas-fired air circulation system is shown here. The heating unit is placed at one end of the orchid range house. Air is circulated at 2100 cu. ft. per min.

Forced Air Circulation Controls Temperature in Orchid Ranges

Reprinted from Pacific Coast Gas Association Bulletin No. 112 on Gas Utilization Data.

THE PROBLEM

TO heat commercial orchid ranges uniformly.

There are two 32 ft. x 90 ft.; one 21 ft. x 90 ft., and two 33 ft. x 140 ft. hip roof houses. The number of plants in the houses varies from 4500 in the small unit to 9500 in the largest.

The customer is the largest importer and wholesale distributor of orchids in the United States, and prompt recovery, from the effects of shipping and rapid, sturdy growth are essential. If these requirements are met, turnover of plants is rapid and adequate stocks can be maintained without huge stockpiles.

All types and kinds of orchids are grown, which further complicates the problem.

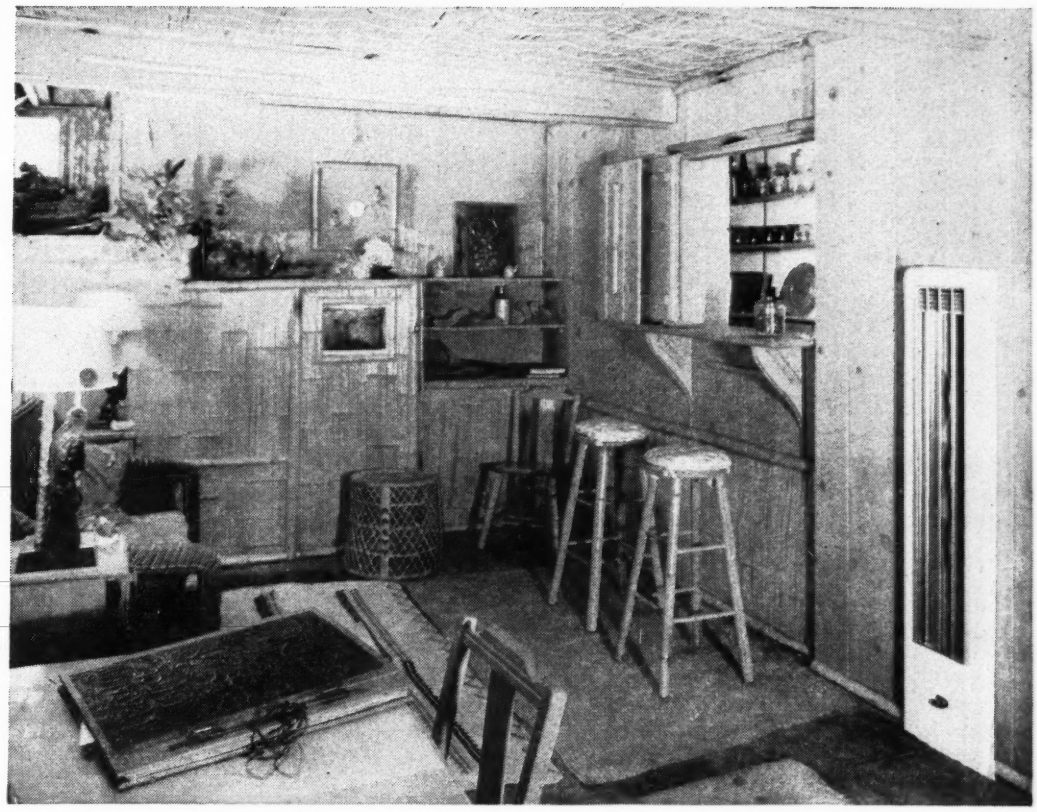
SOLUTION

A 250,000-Btu natural gas fired forced circulation Aladdin Air Heater is used in each house. The heating unit is placed at one end of the house in a lean-to room. All air for combustion and fresh air makes up for the house is screened to prevent insects from entering. Seventy-five per cent of the air is recirculated.

The inlet duct is under the center of the central bench and tapers from 26 in. diameter at the inlet to 18 in. diameter at the opposite end. Two rows of 1½-in. diameter vents, spaced 6 in. centers, are in line—one row on each side of the duct on the horizontal diameter.

There are two return ducts, one under each outside bench and racked about 4 in. off the floor. Each return duct has one row of inlets along the bottom, 1½ in. in diameter and spaced 6 in. centers. They are tapered from 12 in. diameter at the far end to 20 in. diameter at the heater inlet.

Air is circulated through the range at 2100 cu. ft. per minute. Minimum temperature is maintained to suit the particular type of orchids in the house by thermostats suitably placed. Orchids which require similar temperature and humidity conditions are grown in the same house, thus making



TODAY'S BEST HOME-HEATING TEAM
GAS and the NEW PANELRAY HEATER

To homes already built or now being built, PANELRAY brings the modern comfort of radiant infra-red gas heating.

This new completely vented gas heater radiates invisible infra-red rays throughout the "live-in" zone of a room, giving occupants instant head-to-toe warmth.

PANELRAY may be installed in any corner or standard wall of any room, requiring only gas connection and vent pipe. No substructure or floor cutting necessary, because entire unit stands above the floor.

The patented "Heat Trap" flue baffles the upward rush of heat, deflecting maximum warmth out into the room while allowing burnt gases to escape. This exclusive feature assures fullest utilization of fuel consumed.

PANELRAY comes in single units of 10,000, 20,000 and 30,000 BTU—and in dual units of 20,000, 30,000 and 40,000 BTU for heating adjacent rooms through a common vent. All models A.G.A. approved for use with any kind of gas. Manually or thermostatically controlled.

Write for booklet giving complete Panelray story

DAY & NIGHT MANUFACTURING CO.

MONROVIA • *One of the Dresser Industries* • CALIFORNIA

for better growing conditions. Each range is separately heated and controlled.

When the house temperature reaches 90°F., a thermostat turns on a spray of cold water in the inlet duct and at the same time turns on the circulating blowers, but not the gas. It is possible to lower the temperature in a house 20° by this method and at the same time maintain proper humidity.

RESULTS

The customer states that temperature differences in the houses are at a minmum and control is the easiest he has ever experienced. Atmospheric conditions in the houses are particularly clear. Plants develop rapidly and form sturdy growth. Fuel bills have also been very satisfactory.

A. J. PERRY, JR.
Pacific Gas and Electric Co.

How Astoria Boosted Winter Peak Gas Make to New High of 95 MMcf

Excerpts from paper presented at the AGA Joint Production and Chemical Committee Conference, New York, June 2-4.

THE plant had twice produced almost 92 MMcf per day during a previous winter. It had required the operation of 22 machines to accomplish this on one occasion, which was something new and a bit of a strain at the time. This did not keep our management from hoping that 95,000,000 could be sent out during the coming winter should occasion demand it. So, in order best to assure the realization of these hopes, certain plans were made and carried out. These may be briefly summarized as follows:

1. *Generator Availability:*

Steps were taken so as to keep a maximum number of generator sets available for operation. These included a revamp of the overhaul schedule and a continuation of our previously established policy of installing silicon carbide refractories in the linings of the coke chutes and generator-carburetor connections in the Williamson sets.

2. *Personnel:*

Sufficient operating personnel were hired to keep 22 sets in continuous operation.

3. *Materials:*

A stock of good quality enriching oil and coke was segregated and kept in reserve for peak loads.

4. *Increased Blow Run:*

The Kennedy Automatics in the "D" house were altered to give shorter intervals of time between events, thus affording a longer blow run period in the cycle.

5. *Back-Pressure:*

To reduce the pressure of the gas at the outlet of the exhausters, the alternate grids were cut out of each tray in the "C" and "D" light oil tower scrubbers. Installation of electrostatic tar precipitators was also begun.

LP—Air Plant

In addition to these items, which were intended to improve the functioning of the existing plant, a liquefied petroleum-air plant was installed. This was designed to provide an additional 18 MMcf per day over a 3½-day period.

As a result of these combined measures, the estimated make of 95,000,000 was actually exceeded on nine different occasions and all previous daily make records were broken by approximately 10%.

Our plans for the future serve to highlight other limitations which restricted our sendout on different occasions, not always peak days:

1. We expect to have two additional condensers installed of larger capacity than the existing ones and to substitute two more of these new condensers for two old ones. This will increase our condenser capacity by 50%.

2. A new exhauster will be installed. We have no spare at present under peak load conditions.

3. Four additional gas compressors will be installed for pumping gas into the company transfer system.

4. The "C" purifier boxes will be converted from three 36-in. layers to two 66-in. layers each. We hope this will permit the passage of more gas. At present they are operated as two 4-box series in parallel with six 5-box series.

5. We have in process of installation a new 12-in. line which will bring steam through the tunnel from the Hell Gate generating station. It will supply about one-third of our winter requirements.

6. The installation of the Hell Gate steam line will permit us to blank off the "C" waste heat boilers. Operation with the old water-sealed boiler valves required the restriction of blower speeds on the "purge run" and "blow run."

GEORGE L. BIXBY
Consolidated Edison Co., New York

Chemically Treated Water-Gas Tar

Excerpts from paper presented at the AGA Joint Production and Chemical Committee Conference, New York, June 2-4.

THE present tar treating facilities were installed in 1937. From 1937 to February 1945, the procedure was to fill the R.S. De-emulsifier Unit with tar emulsion that had received preliminary heat treatment in the 50,000-gal. capacity tank. This treatment consisted in heating the emulsion for 12 hours permitting it to "roll." This resulted in the distillation of large quantities of light oil and their subsequent loss. The contents of this vessel was then given a 24-hour period of quiescense.

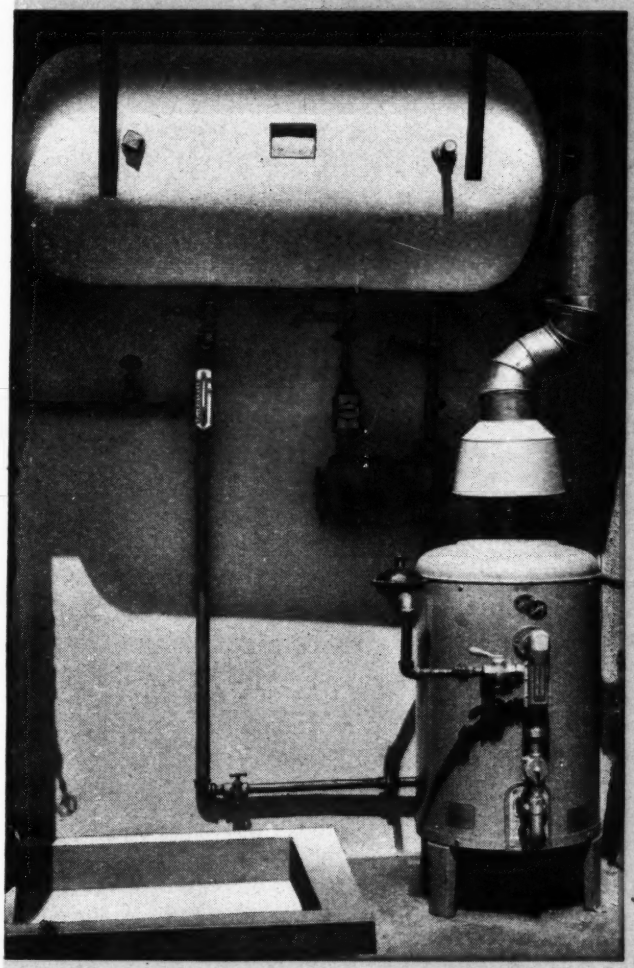
The treatment in the R.S. De-emulsifier Unit consisted in the addition of from 100 to 200 lb. of soda ash, raising the pressure to 90 psi and holding this pressure for varying periods of time, or until the emulsion contained less than 10% of water. The treated tar was then transferred to a 15,000-gal. heater, where it was subjected to a temperature of 180° F. for six hours and permitted to settle to less than 5%. However, since the catalytic treatment has been employed*, the use of this tank for this purpose has not been necessary. Instead, this 15,000 gallon tank is now used for storage of separated tar and represents a 20% increase in storage facilities for separated tar.

The use of this treatment at Kings County Lighting Co. has rendered the process of de-emulsification of water gas tars more expeditious in that it has made possible an approximate doubling of output of tar without the necessity of further installation of tar treating facilities. It has eliminated tar emulsion difficulties with a reduction of approximately 50% in cost of labor, steam and chemicals. The cost of chemicals used at the present time amounts to 0.4 mills per gallon of separated tar. In April 1947, the purchaser offered a premium of ⅛ cent per gal. over contract price for tar at 2% or under. The following shipments after this offer contained 1.8%, 1.7% and 1.8% water up to this writing.

S. A. PETRINO
Kings County Lighting Co.

*Catalyst consists of 50 lb. of soda ash dissolved in 60 gal. of hot water, to which is added 2 lb. Paromate JC. This solution, sufficient to treat 10,000 gal. of tar emulsion, is added in the R.S. De-emulsifier.

This water heater gives you "a clean bill of health"



SMITHway-BURKAY

VOLUME-FLOW WATER HEATER

. . . meets all restaurant requirements . . . gives you a constant supply of 180° *sterilizing* water—or even hotter—with 2° accuracy.

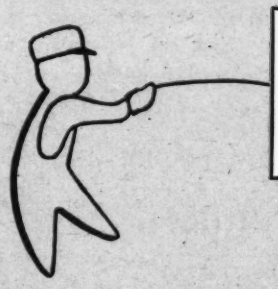
The revolutionary and exclusive SMITHway-BURKAY Patented Booster-Recovery System supplies all the hot water necessary for automatic dishwashing machines, including the final sterilizing rinse.

The same SMITHway-BURKAY unit, at the same time, supplies an ample flow of general-purpose hot water at 140°—as well as sterilizing hot water at 180°. The 180° temperature meets all health and sanitation codes.

More usable floor space is released when you have a SMITHway-BURKAY: the heater is only 20 inches across, only a little more than 5 feet high.

The exclusive Throttl-Flo Thermostat *accurately proportions* the gas flow, according to the quantity of hot water used and the temperature required. The Patented Burner achieves maximum combustion. It operates with equal high efficiency from 10% capacity up to the full rated capacity of 190,000 BTUs per hour.

These are just a few reasons why you should know *all* the facts about the SMITHway-BURKAY. Ask for them today! Simply mail the coupon below.



MERCHANT PLUMBERS!
Every establishment that serves food and drink—as well as apartments, hotels, and many businesses—are prospects for this extra-efficient gas water heater. Quick and easy to install anywhere.

SMITHway-BURKAY PRODUCTS
are manufactured by
THE BURKAY COMPANY
Toledo, Ohio

A. O. SMITH Corporation

A. O. Smith Corp., Dept. G-947, Milwaukee 1, Wis.
Without obligation send me more SMITHway-BURKAY information.
Name_____
Firm_____
Address_____

NEW YORK 17 · ATLANTA 3 · CHICAGO 4 · HOUSTON 2 · SEATTLE 1 · LOS ANGELES 14 · INTERNATIONAL DIVISION: MILWAUKEE 1

Methods of Determining Individual Components of Water-Gas Emulsions

Excerpts from paper presented at the AGA Joint Production and Chemical Committee Conference, New York, June 2-4.

On April 1, 1946, the American Gas Association established a project for the study of water-gas tars at The Pennsylvania State College. At the present time three full-time and one part-time employees are working on the project.

The main objective of the program is to determine the identity of the individual components of these tars so that they may be better exploited by the industry. Since unsaturated hydrocarbons of the resin-forming type which find a ready market are known to be present in these tars, methods of separation and identification of these hydrocarbons are being studied first. Related problems, such as the development of methods of dehydration without loss of the resin-forming constituents and the rapid increase in viscosity of the tar which accompanies this change, are also being investigated.

SINCE the most likely way of obtaining useful and valuable products from water-gas tar seems to be the separation of the resin-forming hydrocarbons, most of the work of the project has been concentrated on methods of accomplishing this end. To date the flash vacuum distillation and the solvent extraction methods seem to be the most attractive and are being studied intensively.

A concerted effort to establish the identification of all of these resin-forming hydrocarbons has not been started as yet, but the identity of styrene, indene and their simple derivatives has been verified. Undoubtedly, other higher molecular weight unsaturates are present and these should be identified after completing the work on their isolation.

Probably the hot storage of water-gas tars induces polymerization of many of the unsaturated molecules, although work in this direction is not complete. On the other hand storage at room temperature appears to have little effect.

The study of the dehydration tar emulsions by the use of pentane has shown that while the emulsion may be broken, not all of the resin-forming molecules are extracted. The use of isopropyl alcohol is another method of dehydrating tars which is being investigated which would have the advantage of not inducing polymerization of the tar-unsaturates. Eventually, we hope to find the answers to these and many other problems connected with water-gas tars as well.

DR. A. W. GAUGER, C. R. KINNEY and R. L. STRUCK
Pennsylvania State College

Field Study of Domestic Hot Water Service from Gas-Fired Boilers

This report describes the various types of gas-fired boilers used for central heating systems which have been interconnected with domestic hot water systems in order to supply year-round hot water service. Such a system has been called a summer-winter hookup in the field. Opinions of householders, gas utilities department heads, service men, sales personnel and gas equipment manufacturers as to their practicability and operating characteristics are summarized. Comparative costs of heating water during summer months with summer-winter hookups and with separate water heaters are reported from records of interested gas companies. This survey was conducted as project DGR-3-CH, under sponsorship of the Committee on Domestic Gas Research, and this resume is digested from the committee report.

In the field survey, costs of gas for domestic hot water during the summer months could be estimated but costs for the winter months were complicated and impossible to obtain. Estimated figures are presented for year-round operation based on certain assumptions which are explained in the text.

THE CONCLUSION

1. From an operating standpoint gas-fired summer-winter hookups have been found satisfactory both by the customer and by the gas utility in some sections of the country. This is particularly true where liquid fuel is popular and where steam or hot water are commonly employed for house heating purposes. Operating costs in other areas would depend on such factors as amount of water drawn, number of house heating days per year, and the uniformity and severity of the usual heating season.

2. While advantages and disadvantages of this system for supplying domestic hot water can be predicted from this survey, further tests are necessary for exact gas consumption comparisons between this type of system and automatic gas water heaters. Such tests should be performed under carefully controlled conditions to reach specific conclusions. In those sections of the country where space heating rates are made available to the customer, water heating fuel costs may be reduced where the boiler also provides the domestic hot water because fuel for hot water heating is billed at space heating rates.

3. When using the summer-winter hookup a minimum boiler temperature must be maintained to allow for an adequate supply of domestic hot water. The temperature of the boiler water in a hot water heating system cannot be reduced with variations in the outdoor temperature during mild weather. This lack of flexibility imposed as a result of the summer-winter hookup may result in higher house heating costs than would otherwise be the case when using hot water heat.

4. Most of the installations examined in the field were not designed for use with gaseous fuels but were subsequently converted to gas. This necessitated the assembly of the component parts of the water heating system from various sources. If completely built gas designed units were generally available they would insure installations of improved appearance.

5. When using summer-winter hookups, additional accessories such as low limit controls, mixing valves, and reverse acting controls are often needed. The heating engineer must include the cost of such additional items essential to the functioning of the domestic hot water supply, but not to the heating system, when comparing initial investment cost of summer-winter hookup operation with a separate gas-fired hot water storage heater.

Rapid Drying Of Textiles

Reprinted in full from Pacific Coast Gas Association Bulletin No. 111 on Gas Utilization Data.

THE PROBLEM

ULTRA modern, efficient and economical devices are being used in the laundry industry for washing, extracting, conveying, and packaging. But drying the washed material is still to a large extent being carried out in the same old way—namely, by piping live steam to the drying tumblers and

IN KEY CITIES HELPS INCREASE AIR CONDITIONING

Testimonial-type ads like these are resulting in good leads . . . and good will

Already a number of key cities throughout the country are using local newspapers to tell prospects about Servel *All-Year* Gas Air Conditioning . . . *and with marked success.* These advertising campaigns are particularly effective because they have been tailor-made to fit special local conditions.

For example, the Lone Star Gas Co. of Dallas, Texas, has been running a campaign over its signature for more than four months. These ads feature the testimonials and photographs of local bona fide users who enjoy the all-year comforts of Gas Air Conditioning. Some of Dallas' finest homes and leading commercial establishments are shown. As a result of this highly specialized "home town" advertising, the sales of Servel *All-Year* Gas Air Conditioning have steadily increased. What's more, this campaign has been highly instrumental in promoting the modernity of gas . . . and building good will for the Gas Industry.

drying indirectly.

A new method of direct heating by forced hot air has been perfected and many laundries have adopted this system for drying operations.

The Cotton Products Co. of San Francisco, producer of cotton wiping rags, has recently converted four large tumblers from steam to direct hot air.

EQUIPMENT

The equipment consists of four gas-fired Dryair heaters built and sold by the Radiant Drying Co., Hollywood, Calif. The heaters will operate on any combustible gas, at 6 in. or more water pressure. The unit is equipped with a blower driven by 240 volt motor, which may be either 50 or 60 cycle, single or three-phase. Heaters are sized from 200,000 to 864,000 Btu per hour output, the latter having a capacity equivalent to a 20-hp boiler.

The unit is provided with pilot and safety features; i e., if the duct gets overheated, or the pilot goes out, or the electricity fails, or if the heater blower fails, a solenoid valve closes and the gas is shut off immediately.

OPERATION

In operation, gas and fresh air are drawn into the blower which premixes the air and gas in the correct proportion for complete combustion. The blower forces the gas-air mixture through a manifold and the burner nozzle into a combustion chamber where it burns in the presence of secondary air. The resulting hot air is forced into the tumbler from which the saturated air is removed by the tumbler exhaust fan. The heater is connected to the tumbler by a sheet metal duct. The duct work should be insulated to eliminate heat loss and improve working conditions.

A 600,000-Btu unit will produce 400 to 600 lbs. of dry laundry per hour.

In this method of direct heating, hot dry air circulates through the material to be dried, causing water in the material to vaporize and be carried off in much less time than by any other method. In getting the water out of the material quicker it not only is dried faster, thus increasing production, but also results in reduced tumbling time, increasing the life of the goods.

RESULTS

The customer has claimed a saving in drying time of about 20 minutes per cycle and has increased production at least 30% over the old method of drying with steam coils. He also claims less maintenance cost and attention in operation, and has more steam available for his washing operations.

CHARLES A. CARLSON
Pacific Gas and Electric Co.

Use of Bimetallic Thermal Elements In Pilot-Operated Safety Controls

Abstract of AGA Research Bulletin 42, sponsored by Committee on Domestic Gas Research.

BIMETAL elements used as actuating members of automatic pilot operated safety controls should be chosen for use under the conditions of maximum bimetal temperature rather than ambient temperature encountered.

Careful consideration is necessary in the selection of bimetallic thermal elements to insure that they will not be overstressed under the temperature and load conditions at which they will operate. Proper choice of bimetals for operating temperatures above 800° F may be difficult as there appears to be considerable difference of opinion among authorities regarding the magnitude of permissible working stresses at such temperatures. Also, results of this investigation have shown that some bimetals designed for use at temperatures above 800°F would develop a permanent set when subjected to loads and temperatures supposedly well within the specified working limits.

In view of these facts, it appears that control manufacturers who contemplate using bimetallic thermal elements at temperatures of 800°F or above should determine the effect on the physical properties of the bimetal, especially as regards permanent set, of the temperature and stress conditions under which the control is designed to operate.

Appliance manufacturers should exercise care to protect bimetal elements from excessively high spot temperatures. In some cases it may be necessary to shield the element from main burner heat, or intense pilot flame heat, or both.

Bimetal manufacturers are equipped and willing to aid safety control manufacturers in the proper selection and application of bimetallic elements. Considerable data have been published both by bimetal manufacturers and others on properties of various bimetals. These data are generally reliable providing they are given proper interpretation.

Additional research is needed to determine effects of corrosion on bimetals and it is recommended that effects of temperature and corrosion on performance characteristics of the uneven expansion, liquid filled, rod and tube and thermo-electric type actuating elements be studied. Also it appears that the effect of corrosive components in some fuel gases and atmospheres on related parts of safety devices made of stainless steel and monel metal should be investigated.

Aluminum Chimney Liners Stand Up Against Corrosion Due to Condensation

Excerpts from a paper presented at the Mid-West Gas Association convention, Omaha, Neb., April 7-9.

THIS fall Minneapolis Gas Light Co. expects to distribute straight natural gas to its consumers. In this case, the natural gas will contain .5 grain total sulphur (including odorant) compared to 2.5 gr/100 cu. ft. in our present mixed gas. This is a reduction of 80% in sulphur content and from our foregoing study, I believe it may be possible to vent the flue gases without a liner if the flue stack temperature is kept at 400°F and above, and the boiler or furnace is well cleaned at the time of installation. If poor draft conditions are encountered, then I recommend a stack temperature of 450°F. The raising of stack temperatures to 400°F would result in about 1% decrease in efficiency to our average customer which in dollars and cents amounts to about 80 cents per year. In the case of 450°F. stack temperature, the decrease in efficiency would be about 4% or $3.20 per year.

In the meantime, until the above can be proven by actual field tests, we will continue using aluminum, since evaluating the three major types of liners used to date (glazed sewer tile, asphalt or plastic coated steel, and aluminum), according to the number installed and the number of years each type has been in service, it appears that aluminum is standing up the best. It is my opinion that installed properly in a clean furnace or boiler and without touching any mortar or iron, the aluminum liner will last indefinitely (22 gauge aluminum).

GEORGE B. JOHNSON
Minneapolis Gas Light Co.

Operating Experiences with Angle Type Compressors and Stations

Presented at Natural Gas Spring Meeting, Chicago, April 30-May 1, 1947.

The purpose of this paper is first to present a brief descriptive history of the Tennessee Gas Transmission Co.'s compressor stations; and second, to point out certain design features and to show their effect on the operation of the equipment.

AFTER several months of full load operation in the initial stations, a number of engines were examined for mechanical trouble. Failures were found to vary considerably with the make of engine. The connecting rod bearings in one type engine were failing rapidly. This was found to be caused by the bearings being too loose and was eliminated by a change in the method of tightening. The manufacturer has since furnished a new design which is proving very satisfactory.

Vibration set up in the fly wheel in one type engine at certain critical speeds, and it was necessary to install vibration dampers to eliminate this trouble. This vibration was caused by a very heavy wheel supplied by the manufacturer in order to permit a wide range of operating speed, which incidentally is not required in the operation of this pipe line system. A lighter wheel which operates through the required speed range is now being furnished by the manufacturer, and has proven very satisfactory.

The scuffing of cylinders and pistons was found in another make engine which has apparently been eliminated with a change in the direction of rotation, a proper balance of the load between the power cylinders and a change in the grade of lubricating oil. It has been found in the operation of these two-cycle multi-cylinder fuel injection type engines that an unequal balance of the load between cylinders has caused the failure of rings, cylinders and pistons in the overloaded cylinders.

One particular problem found in the operation of these engines which has apparently caused cylinder failures is the clogging-up of intake ports with carbon which prevents sufficient scavenging air from reaching the affected cylinder. When loss of power is sufficient in some of the cylinders to cause too great an excess load on other cylinders, piston seizure occurs in those overloaded cylinders. Study is now under way toward reducing the oil consumption with the thought of preventing this formation of carbon. A routine inspection schedule has been put into effect in order to prevent sufficient formation of carbon to cause cylinder failures.

Too much cannot be said about having a proper balance of load between cylinders in a multi-cylinder engine, especially where the equipment is operated at full load practically 100% of the time. There has been approximately 3¼% failure in power cylinders during the two and one half years of operation, and it is the general opinion that these failures have been caused by an overloaded condition in the individual cylinders. Power ring replacement has been 1.1%, piston rod packing 2.8% and compressor rings 3.2%.

O. H. MOORE

Tennessee Gas Transmission Co.,
Houston, Texas

Installation of Gas Service Piping

Presented at Twenty-third Annual Distribution Conference and Sixth Conference on the Operation of Public Utility Motor Vehicles, Cleveland, April 14-16, 1947.

THIS paper has been prepared to present the results of a survey of the practices being followed today by a representative group of gas companies throughout the United States in the installation of domestic service lines.

The survey consisted of a number of questions which have been answered by 117 gas companies, owning and operating approximately 11½ million service lines. It is estimated that these companies represent more than one-half of the gas industry in the United States. In the tabulation of the answers to this questionnaire, all data is included which seemed to be clearly set forth, although a few of the answers were somewhat indefinite as to their meaning, probably because of a lack of clarity in the wording of some of the questions and, therefore, were not tabulated.

The tabulation is divided into seven parts, one for each of six geographical sections, and one for the totals of all six geographical sections. Each of the seven parts is divided into three columns—one for the totals of all gases, one for natural gas, and one for manufactured or mixed gas.

E. L. HENDERSON

United Gas Corp., Houston
Chairman, Subcommittee on Construction & Maintenance

Pipe Line Flow Subcommittee Interim Report

Presented at Natural Gas Spring Meeting, Chicago, April 30-May 1, 1947.

AT the Spring Meeting of the Natural Gas Department in 1946, the Technical and Research Committee conferred with representatives of the Petroleum and Natural Gas Division of the Bureau of Mines with regard to a proposed re-opening of the study of pipe line flow. As a result of this conference and some further negotiation, a cooperative agreement between the American Gas Association and the Bureau of Mines was signed in September.

Under the terms of the agreement, the Association will bear the major cost of the project, which has as its ultimate objective the formulation of an accurate method for calculating the capacity of natural gas pipe lines under a wide range of operating pressures and flow rates. The Bureau of Mines is furnishing, among other things, housing, transportation, and a large part of the necessary laboratory equipment; as well as the wealth of experience of Bureau engineers not assigned directly to the project. It is anticipated that approximately 3½ years will be required to complete the project.

To coordinate the work, a Pipe Line Flow Subcommittee was appointed, with C. H. M. Burnham, vice president and chief engineer, Panhandle Eastern Pipe Line Co., as Chairman. The Bureau designated J. William Ferguson, Senior Natural Gas Engineer, to take charge of the work, under direction of Bureau officials and the Committee.

The pipe line flow work is being conducted at the Amarillo Helium Plant, Amarillo, Texas, where the Bureau has its own natural gas wells, compressors, and laboratories available for this work.

The Committee is pleased to report that work on the first phase of the project, a review of literature, has been completed, with the possible exception of a few pertinent papers which may not have come to the attention of the committee.

As a part of the report of the Pipe Line Flow Subcommittee, and to show the progress of the work to date, a report by Mr. Ferguson, entitled: "Pipe Line Flow Studies, Part I: Review of the Literature and Analysis of the Flow Equation" is included in this Interim Report.

J. WILLIAM FERGUSON
U. S. Bureau of Mines, Amarillo, Texas

Customer House Heating Service Policy

Excerpt from a paper presented at the Mid-West Gas Association convention, Omaha, Neb., April 7-9.

A plan was devised to try and sell the customer on the idea of having his furnace checked, pilot cleaned and lighted about two weeks prior to the first of September. It was also explained to them that in this manner our man would have more time to go over their heating equipment and do a better job than when the rush was on; also that due to wartime restrictions, we would be unable to give the fast kind of service they had received in the past with regard to starting their heating equipment.

A list of customers, whose furnaces we had turned on in previous years, was compiled. Addressograph plates were set up on those customers in exact duplication of the routine in the meter reading books. This list is maintained from year to year and such corrections as are necessary are made about the first of August. They are then run off and sent to the Service Department—all routed and ready to go about August 15.

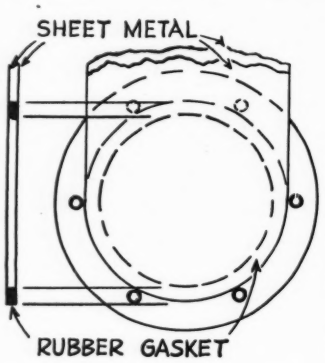
An attractive card was printed as a "Not Home" card for those customers who were not at home when we called, and stated we would call again at a later date. A hole was punched in one corner with a rubber band inserted to slip over the door knob, so they would know we had called at their house to light their furnaces. At some homes, we were received with understanding cooperation. At others, the lady had a look of consternation on her face: "Trying to light a furnace pilot with the thermometer standing at 100 degrees in the shade." The first year about 25% of our customers took advantage of this idea. Each year the percentage grew—until last year there was practically no rush at all on the first cool days.

H. M. WILKERSON
Central Electric & Gas Co.,
Lincoln, Nebraska

Bulletin on Research in Fundamentals Of Atmospheric Gas Burner Design

AGA Bulletin 41, Research in Fundamentals of Noise of Extinction of Large Gas Burners, represents an extension of studies on noise of extinction of atmospheric type burners reported in Research Bulletin No. 10, "Research in Fundamentals of Atmospheric Gas Burner Design." It presents a mathematical relationship between factors of burner design, gas flow, and percentage of primary air at which no noise of extinction occurs with large burners operated on manufactured gas. This mathematical relationship is applied to contemporary burners operating in a combustion chamber as well as in open room conditions. Factors affecting intensity of noise of extinction are also included.

An Operating Kink



IN THE SELECTION OF GASKETS there are a number of things that must be considered. For instance, to what temperature will the gasket be subjected? Temperature has much to do with proper selection. Thus if the gasket will not be heated above 240 deg. F. it can be a non-metallic gasket. If it will be heated to a range between 240° and 800° F an asbestos or asbestos covered gasket may serve the purpose. And if the temperature will run above 800° F a metai gasket usually gives the best service.

What kind of flange is to be gasketed? That is an important question as it is the flange that usually determines the type of gasket to use. Next comes the factor of pressure. Is it a liquid? Gas? Steam? Is it corrosive? Upon these things depends the selection of the kind of gasket material. Rubber must not be used, for example, if the fluid is gasoline. Copper must not be used if the gas is ammonia. And so on.

What is the nature of the flange surface? It should be smooth, preferably, to facilitate perfect sealing. Perfect contact between the gasket and flange surface is essential to assure tightness and prevent leakage. Rough flange surfaces, such as we all too commonly see, are a liability. The notion that roughness is necessary to prevent gasket slippage is fallacious.

How can I install a thin and flimsy gasket between flanges already in place in a pipe line? is a common question. The accompanying sketch shows how it has been successfully accomplished on large pipes with thin and flimsy rubber gaskets that were giving much trouble because of folding or buckling.

PROCEDURE: Let us say, for example, that you have a pipe joint that has been unbolted and the old gasket has been removed. The problem is to install a new gasket in place of the old one and be certain that it has not folded or buckled and that it is in its proper place. Do it in this way: cut out two pieces of sheet metal as indicated in the sketch, one end being rounded to the exact curvature of the bolt circle, which is the same as the outside curvature of the gasket. Place the gasket between the two pieces of sheet metal as shown in the sectional view, and then insert the assembly carefully between the flanges to the position shown in the sketch. Carefully withdraw one of the pieces of sheet metal, and then the other, leaving the gasket behind in correct position for bolting.

Before inserting the gasket between the pieces of sheet metal, make certain that no surface is "sticky" at any point, so that the position of the gasket will not be disturbed when the pieces of sheet metal are withdrawn.

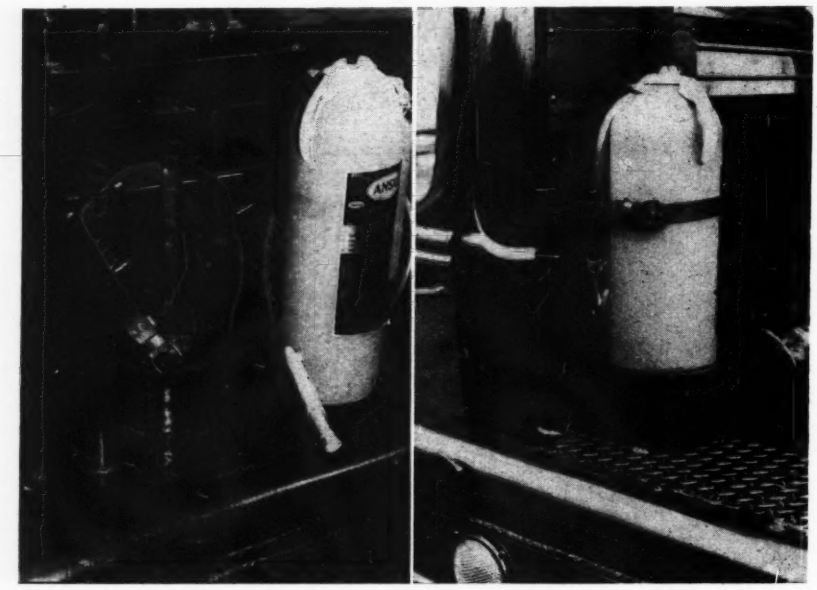
a family favorite . . .
the HUMPHREY RADIANTFIRE
Circulator

Like a fine piece of furniture, the Humphrey Radiantfire Circulator quickly becomes a favorite of the entire family. Its graceful, modern styling and beautiful two-tone, Opalescent brown finish harmonize with any style of home furnishings. All the charm of an open fire, together with the additional advantages of warm air circulated heat, is available with this fine gas heater. Pure, radiant heat pours from the Open Front of the Humphrey Radiantfire Circulator, while an abundance of circulated warm air passes out through the grille at the top of the heater. Complete comfort is provided for every part of the area needing heat.

GENERAL GAS LIGHT COMPANY
KALAMAZOO MICHIGAN

A HUMPHREY H PRODUCT

23 WARREN ST., NEW YORK CITY • 2nd UNIT SANTA FE BLDG., DALLAS • 225 ELEVENTH ST., SAN FRANCISCO



Truck-Mounted Fire Extinguisher

PREPARED BY O. C. Irvine, editor, "United Gas Log," United Gas Pipe Line Co., Shreveport, La.

The Dugas type fire extinguisher has proved to be a necessary adjunct to maintenance truck equipment for use on gas fires encountered in repairing pipe line leaks or breaks. It also affords protection for employees engaged in making hot taps or performing other operations wherein gas in a bell hole might become ignited.

When mounted on the truck and carried as standard equipment, a fire extinguisher cannot be overlooked and left behind in an emergency. However, among the chief obstacles to carrying this kind of equipment has been the lack of a suitable mounting or carrying holder that would protect the extinguisher against damage in hauling and at the same time make it readily accessible for emergency use.

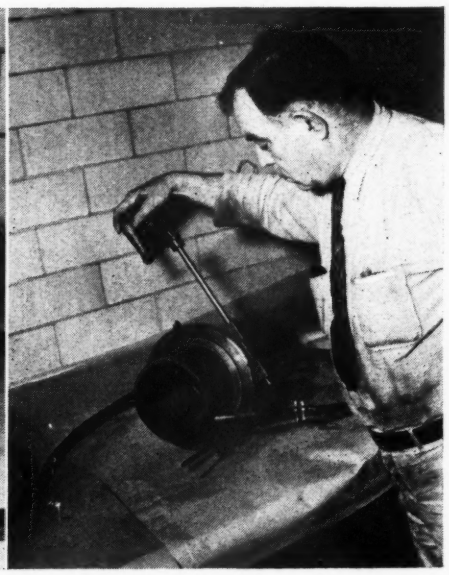
This difficulty was recently overcome for maintenance trucks of the United Gas Pipe Line Co. when M. E. Bennett, foreman of United's Shreveport, La., garage, perfected his design of the carrier bracket illustrated in the accompanying photographs. The bracket, which holds the extinguisher in a rigid upright position and is insulated with soft rubber to offset the constant vibration and jolting of the average pipe line truck, was built principally of scrap materials. The base, fashioned of a piece of 8-in. line pipe 5 in. in height, is electrically welded to the metal bed of the truck on the side nearest the driver and at a point offering the least obstruction to loads which the truck will handle.

Three ½-in. x 3-in. vents flush with the truck bed prevent accumulation of water in the base. Three ⅛-in. x 1-in. rubber-cushioned flat iron ribs form a seat for the extinguisher inside the circular base which is also lined on its inside walls with two ½-in. x ¾-in. sponge rubber strips secured in place by four clamps. An upright brace to which securing buckles and leather straps are attached is of flat iron 1¼ in. wide, welded to the base, also rubber cushioned and extending 11 in. upward from the top edge of the base.

Dimensions and assembly of the bracket described are for an Ansul model 30 dry chemical fire extinguisher. These would have to be varied according to type and size for other extinguishers.

Portable Acetylene Pipe Cutting Tool

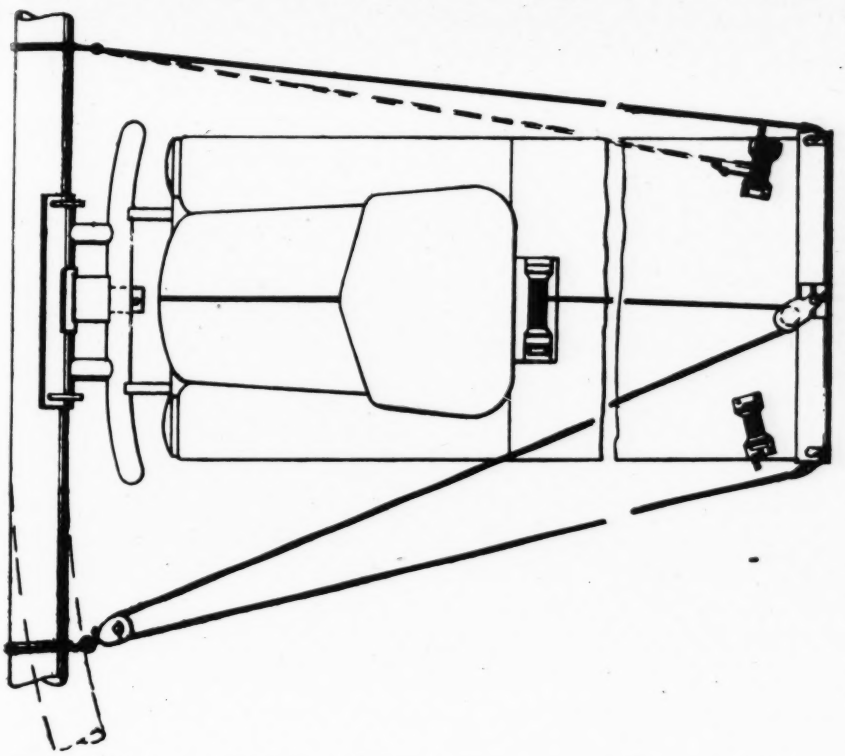
THROUGH THE courtesy of Arthur P. Kelly, editor, "Gas and Electric News," Rochester Gas & Electric Corp., Rochester, N. Y. Sam Lo Temple, the inventor, is a shop foreman and head maintenance mechanic in the company's Gas Distribution department. Eight generations of Lo Temples, including Philip, who made by hand the famous clock in the Cathedral of Milan, Italy, have been mechanics and inventors.



The acetylene pipe cutter developed some time ago by Mr. Lo Temple, has proven to be a great time and money saver. It is easily portable and operates simply and effectively. The device will cut off and bevel, at the same time, pipe from 2-in. to 6-in. diameter, making a uniform, clean cut. It will cut straight or bevel at various angles and will cut in any position from any angle, which makes it useful on the job as well as in the shop.

The cutter, which weighs only about 25 lbs., shortens the time required for trimming. It will cut 40 lengths of pipe in seven hours. One outstanding feature is that when it has been put on a stand it is possible to slide it into action. It will cut various sized holes in wall, ceiling or floor while it is flush against the equipment or material to be cut.

In practice, the cutter consists of an acetylene torch, the nozzle of which is made to revolve slowly about the pipe being cut, by means of the mechanism shown in the pictures.

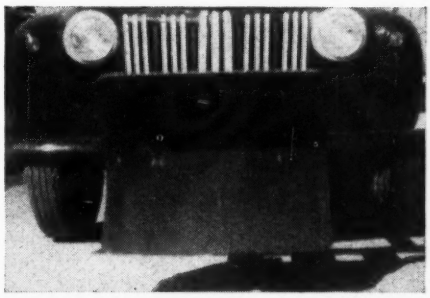


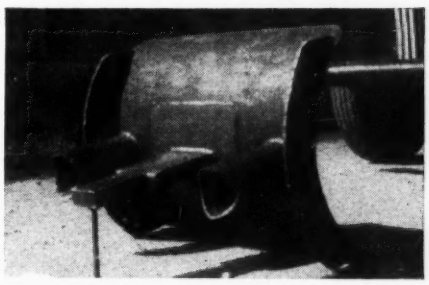
Bending Shoe For Large Size Pipe

SUBMITTED BY Betty M. Willhoite, editor, "Panhandle Lines," Panhandle Eastern Pipe Line Co., Kansas City, Mo. Invented by John E. Steward and D. N. Smith, both of Panhandles' Boonville, Mo., district.

The primary object of the pipe bending shoe is to provide efficient, heavy duty, mobile apparatus of simple form, especially for use in the field, to bend large-size pipe such as used in running cross country gas and oil lines. The apparatus is embodied in a motor truck as part of the equipment, and it may be removed in part so that the truck is available for the usual purposes.

This bending shoe is capable of bending 40-ft. lengths of 22, 24 or 26-in. pipe with one of the "wrinkle belly" fittings welded in center of joint. Hot wrinkle bends may also be made.





San Diego Tries Fiber Glass Coating

SUBMITTED BY LAURAN G. CLAPP, San Diego Gas & Electric Co., San Diego, Calif.

In an experimental installation, the San Diego Gas & Electric Co. is employing fibre glass to protect its gas transmission pipe against soil corrosion, according to C. A. Goldkamp, electrolysis engineer.

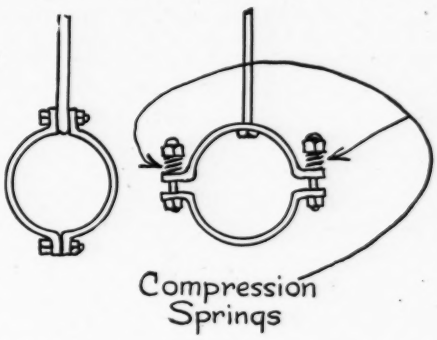
The glass, which comes in rolls like paper, is approximately 1/32 in. thick and is wrapped around the pipe in two layers between liberal coatings of hot tar. The tar protects the pipe against moisture, Goldkamp explained, while the fine mesh of the glass provides a reinforcing to which the tar can cling. An additional feature of the glass, he explained, is that it acts as an insulation against stray electrical earth currents which corrode the pipe and cause leaks.

The company has wrapped approximately 100 ft. of transmission main paralleling Pacific Highway along Mission Bay. Ordinarily, tar and asbestos felt are used to protect the company's pipes against oil corrosion.

Pipe Hanger Device

SUBMITTED BY W. F. Schaphorst, M. E., 45 Academy St., Newark, N. J.

The left side of the accompanying sketch shows a pipe hanger installed by a prominent concern but found to be faulty. Due to its stiffness, steam leaks were caused in various places where the steam pipe expansion was restricted by the hanger. The hanger, supported from an I-beam, refused to



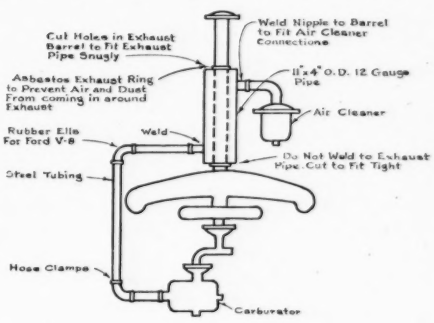
yield in a downward direction, thereby forcing the joints open and causing leakage.

An ingenious and effective solution of the difficulty is shown at the right side of the sketch. The same straps were utilized simply by turning them 90°. The straps were attached to the vertical rod, two bolts (longer than those in the first sketch) were used, and compression springs were added. All leaks were stopped. When there is expansion due to heat, the small compression springs are compressed as indicated, forming gaps between the straps.

Electric Welder Heater Prevents Freezing

INVENTED BY Ernest A. Cousins, pipe line repairman at the District No. 2, Liberal, Kan., station of Panhandle Eastern Pipe Line Co. Illustration through the courtesy of "Panhandle Lines."

This electric welder carburetor heater stops freezing and is being used


Cut Holes in Exhaust Barrel to Fit Exhaust Pipe Snugly
Weld Nipple to Barrel to Fit Air Cleaner Connections
Asbestos Exhaust Ring to Prevent Air and Dust From coming in around Exhaust
1¼" O.D. 12 Gauge Pipe
Air Cleaner
Rubber Ells For Ford V-8
Weld
Do Not Weld to Exhaust Pipe. Cut to Fit Tight
Steel Tubing
Hose Clamps
Carburetor

successfully on a 200 amp Lincoln welder at the Liberal shop. The device is a great help on pressure welding by keeping machine running smoothly in cold weather.

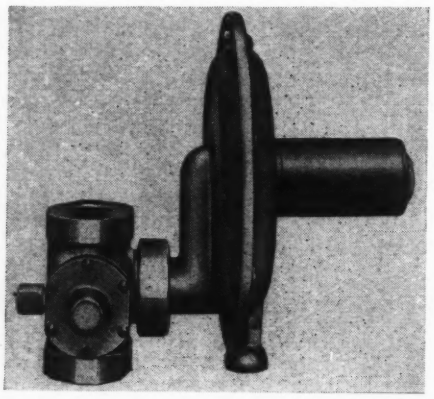
NEW PRODUCTS

Gas Service Regulator

UNIVERSAL CONTROLS CORP., Garland, Dallas County, Texas.

MODEL: Type 47 without relief valve. Type 47R with relief valve.

APPLICATION: These regulators are intended primarily for natural gas but may be also used on other gaseous fluids



such as propane, butane, air, etc. Their major use will be ahead of domestic type gas meters, reducing intermediate gas pressure from pounds to ounces, as required for domestic or industrial service. They are also applicable for reducing gas pressure to ounces as required on engines burning gas fuel.

DESCRIPTION: The plane of the diaphragm is always in a vertical position, with a breather vent or drain located at the bottom edge of the diaphragm casing to permit complete drainage of any atmospheric moisture which might otherwise collect in the diaphragm casing. Elimination of this water avoids failure of regulator when freezing conditions occur. Regulator incorporates a pitot tube, or breather, for boosting service pressure as flow increases. A union joint between diaphragm assembly and body permits rotation of body for installation in either a horizontal or vertical pipe line. This is done without disturbing position of pitot breather tube.

Diaphragm casings are stamped from heavy gauge sheet steel and are heavily plated with cadmium. Diaphragm is completely enclosed by lip of casing, which protects it from rotting by avoiding exposure of diaphragm edge to sun and weather. Steel construction provides a stronger regulator, yet the entire assembly weighs only 8 lbs. Pipe ends on valve body are hexagon shaped for easy application of wrench. Type 47R with relief valve, as illustrated, has relief valve built directly on body as an integral part to obtain greater relief capacity than is possible if located on diaphragm casing.

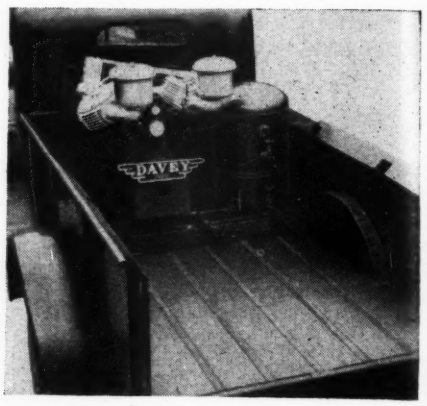
Regulators either with or without relief valves are built in ¾-in. 1-in., or 1¼-in. pipe sizes, and are suitable for inlet pressures from 1 to 175 lbs. Five sizes of orifices are available, with each size adapted to a certain range of inlet pressure. Five sizes of adjusting springs are also available, covering a range of reduced pressures from 1 oz. to 7 lb. Each spring is dyed a specific color for easy identification.

Power Take-Off

DAVEY COMPRESSOR CO., Truck Equipment Division, Kent, Ohio.

MODEL: Packaged heavy duty power take-off for Dodge power wagon trucks.

APPLICATION: Take-off is ideal for air compressors, generators, gas well



bailers, concrete mixers, farm machinery, fire-fighting equipment, welders, machine shops, pumps, insulation blowers, rock crushers and hammer mills.

DESCRIPTION: The power wagon take-off package is furnished complete and ready for installation. There is nothing to fit or adjust. It uses, as its basic principle, an internal and external gear drive. This operates as a strong and durable spline, contrasted to the series of rotating and meshing gears used in transmission type take-offs. The illustration shows rear view of a 105 cfm truck-mounted air compressor operated direct from Dodge power wagon engine through the power take-off. Auxiliary engines are eliminated.

Clamp Support

HOLUB INDUSTRIES, INC., Sycamore, Ill.

MODEL: Loop Type Plastic Clamp Supports.

APPLICATION: For mounting wires, cables, tubes, pipes, rods, hose, etc.

DESCRIPTION: These clamps are made of a tough plastic with great tensile and impact strength. Compared to metal,

they are said to be excellent insulators, insuring against short circuits. They withstand extreme temperature changes of —78° to 180° F, are unaffected by atmospheric conditions, and prevent corrosion and sweating. Since the material is pliable, the support opens to any dimension to slide over wires, pipes, tubes, etc. Rounded edges prevent cutting of wires and copper tubes. One hole saves time in drilling. The clamps, available in 16 stock sizes, may be used over and over again.

The Inland Door Closer

DESIGNED for CONVERSION BURNERS

OVER 50,000 IN USE

This device, designed for conversion burners, automaticallly closes the fire door of a boiler or furnace when blown open.

It consists of a cadmium plated door hinge pin, spring and wedge. The hinge pin replaces the regular fire door pins, the spring furnishes the motive power and the slotted wedge holds the fire door in the open position when required.

Furnished in 3/16 — 1/4 — 5/16 — 3/8" Sizes

INLAND MANUFACTURING CO.

1120 N. Cicero Avenue, Chicago, Ill.

Fraser Dept. F-C 11, 11 West 42nd Street, New York 18, New York

TELL ME ABOUT THE FRASER FRANCHISE.

Name_____

Firm_____

Address_____

City_____ State_____

THIS COUPON is the next best thing to a blank check

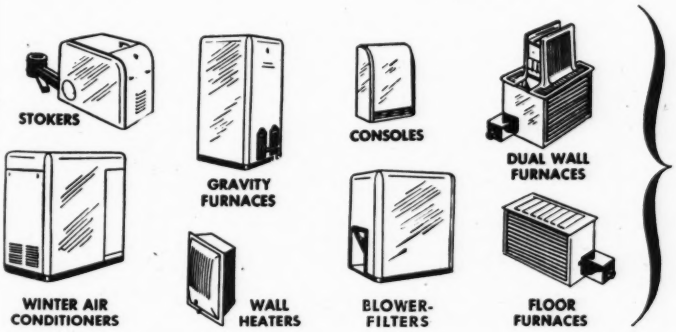
It may be your opportunity to get the famous Fraser Franchise!

This Franchise puts you on the receiving end of one of the most complete lines of home heating merchandise backed by a 25-year name of heating experience.

And only *you* can sell this line in your franchised territory.

Sales promotion and dealer aids, big carload discounts, a dealer financing plan, all these and more back up this big line that's priced for profit and volume.

We've a big story to tell and a real opportunity to offer eligible prospects. You owe it to yourself to investigate. Mail the coupon now!



Get yourself a

Fraser FRANCHISE

All gas appliances are approved by the American Gas Association. All electric appliances are approved by Underwriters Laboratories, Inc.

"Elno"

TRADE MARK REG.

RUST PREVENTER

For Automatic Water Heaters, Range Boilers, And All Types Of Hot Water Storage Tanks

"Elno" prevents rusty water in domestic and industrial water heating systems. It is a pure and simple rust preventer. It extends the life of galvanized storage tanks, especially where corrosive water conditions exist.

"Elno" is made to fit all makes of Automatic Water Heaters, Range Boilers, and Large Volume Hot Water Storage Tanks.

"Elno" is easy to install. Remove the hot water fitting and replace it with the "Elno" rod—that's all. "Elno" is equipped with a hot water fitting.

"Elno" enables you to sell Clean, Rust-free Hot Water Service. "Elno" gives you another talking point, an added selling feature.

There is an "Elno" made to fit the water heater you sell.

Write for prices.

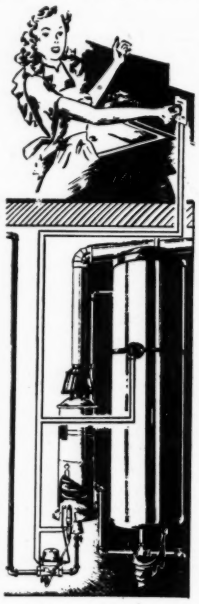
If you want to read the Story of Corrosion, its Causes and Prevention, write for Facts Bulletin No. 102.

The Cleveland Heater Co.
"Elno" Division
2310 Superior Avenue
Cleveland 14, Ohio

Hot Water Control

SCHAEFER ELECTRICAL PRODUCTS CO., 5672 12th St., Detroit 8.

MODEL: Aquamat Hot Water Control.



APPLICATION: For the conversion of gas-fired side-arm water heaters of conventional design to a remotely controlled automatic operation.

DESCRIPTION: This three-position remote control switch in the kitchen or bath provides a controlled volume of hot water at a controlled cost of operation by (1) Automatic operation of the heater so that a predetermined amount of hot water is maintained constantly in storage; (2) Manual operation by which a controlled amount of water is heated before the heater automatically shuts off and stays off; (3) An "off" position provided for making the heater inoperative.

Domestic Range

TAPPAN STOVE CO., 250 Wayne St., Mansfield, Ohio.

MODEL: Nos. 2, T-2, TV-2, TVH-2, 63, V-63, V-65, CPV-667.

APPLICATION: For use in domestic kitchens.

DESCRIPTION: The Tappan deluxe model, the CPV-667, includes among features automatic oven control, concealed oven venting, two electrical outlets, concealing dial controls, oven "on" indicator, drip trays, top burner indicator lights, and Pyroglas plates. Dimensions are 40 in. length, 26¾ in. depth, and

36 in. height. The body is built flush to the wall in welded one-piece construction, with porcelain body sides, and new front radius. The cove top includes a light in the top roll, chrome escutcheon plate, 3½-hr. timer, Telechron electric clock.

The cooking top is divided into deep rectangular grates. The top burners, in chromelite finish, are one giant, one mighty-mite, and two standards; equipped with four lock-type simmer valves, chromelite reflector trays, and removable porcelain drip trays. The visualite oven, which is 17 in. x 20¼ in. x 15 in., has ribbon-type, non-tilting racks, five oven rack positions, porcelain sani-clean oven liners, and a removable oven bottom tray. The broiler is equipped with a silent, one-piece, ball bearing drawer, is a clean-quick broiler pan. Wire shelves in compartments are adjustable.

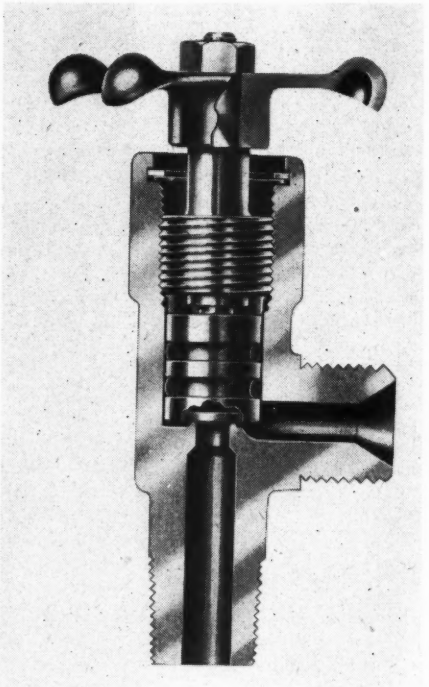
Stem Valve

SECURITY VALVE CO., 410 San Fernando Rd., Los Angeles 31.

MODEL: SE-CO packless stem valve.

APPLICATION: Approved for operating pressures from 1 oz. to 3500 psi; operating temperatures from 70° to 250° F. Maximum open and close torque is 35-in. lb.

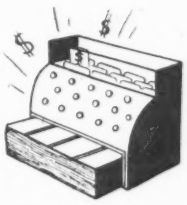
DESCRIPTION: The SE-CO packless stem valve will not freeze in either open or closed position. It also may not be disassembled by turning the spindle beside the open position. A brass retaining washer, held in place by a Waldes snap ring, stops upward motion of the spindle at the wide-open position. Since the retaining washer is free to rotate, there is no possibility of the spindle becoming wedged in the open position. In the closed position, downward motion of the spindle is halted both by the valve's Neoprene seat and a metal-to-metal contact. Increasing gas pressure against the exposed portion of the Neoprene seat is translated into increasingly firm contact at the actual sealing points.



Equipped with Neoprene "O" rings, as well as a Neoprene seat, the SE-CO valve also has a heavy-duty forged brass body and a full-grip hand wheel. Weight is 1.35 lb.; height is 4½ in. open, 4¼ in. closed. The SE-CO valve is listed by the Underwriters Laboratories Inc.

Sing a song of Comfort!

and Ring a song of SALES!



YES, the revolutionary new Hammel Comfortaire will play a tune on dealer's cash registers everywhere — because it gives the people everything they want — Automatic Gas Heat at its best!

Striking in design, outstanding in performance, the Comfortaire is the subject of Hammel's bigger-than-ever consumer advertising this year. Demand is assured—the Comfortaire is in production—cash registers are ringing.

Hadn't you better chime in? Hammel dealerships are open in a number of territories. Comfortaire, Circulaire, Consolaire—these and other Hammel Gas Furnaces are the finest yet engineered.

You can make good money with Hammel. Write us today for Comfortaire literature, full data on our dealer franchise offer.

COMFORTAIRE FEATURES

***1. Saves time*—full heat reached very quickly. *2. Saves fuel*—highly efficient. *3. Saves space*—installed in a very small floor area. *4. Is automatic*—thermostatic control. *5. Is clean*—no smoke, no dirt, no soot.**

GAS THE MODERN FUEL

© 1947

Hammel
RADIATOR ENGINEERING CO.
A. S. Martinson & Associates
Successors to Hammel Radiator Corp.
3348 Motor Ave. SINCE 1912 Los Angeles 34

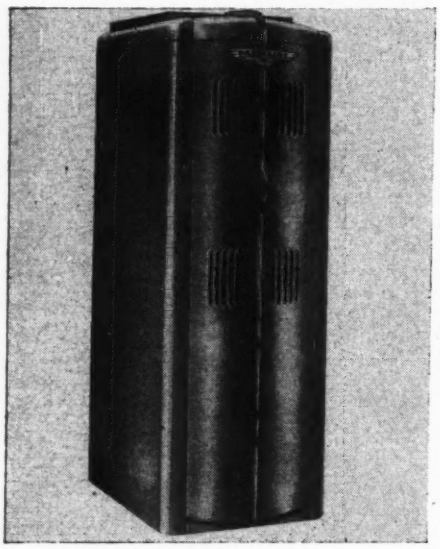
THE NEW HAMMEL Comfortaire

Forced Air Furnace

PALMER MANUFACTURING CORP., Phoenix, Ariz.

MODEL: Palmaire Forced Air Furnace.

APPLICATION: For the average home



where ducts are used for warm air circulation.

DESCRIPTION: Outstanding features include an all-steel,, press-formed, streamline cabinet with silent corrugated steel lining, heavy gauge dieformed steel elements, baked enamel steel burners, automatic controls, spun glass air filter, 1000-cfm blower and a Hammertone blue, baked enamel finish with chrome trim. Overall size is 18 in. wide, 27 in. deep and 55 in. high.

Powered by a heavy duty motor, the model has an approximate 80,000 Btu input. Natural, LP-Gas, or manufactured gas can be used. The Palmaire may be installed in a closet, basement or utility room. All controls are located in the front and are accessible by finger tip front panel removal for easy inspection. Thermostatic equipment is supplied with all sizes.

Radiantrol Valve

HOMESTEAD VALVE MANUFACTURING CO., INC., Coraopolis, Pa.

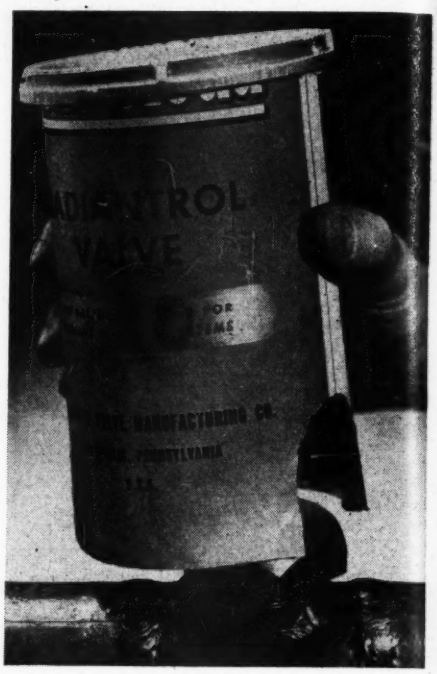
MODEL: Radiantrol valve.

APPLICATION: This balancing valve regulates water flow to individual coils in radiant heating systems in accordance with conditions required in the area served by the coils.

DESCRIPTION: Venting a radiant heating system with this combination balancing valve and air vent is accomplished by removing the brass floor plate and hollow stem, and turning a small cap screw on top of the valve bonnet which is drilled to permit escape of air from the piping system.

Its use is expected to reduce materially installation cost of radiant heating systems because additional piping, fittings and welding required for air vents are eliminated.

The Radiantrol valve is somewhat similar to a butterfly type control valve. It can be used with pipe coils buried as deep as 8 in. below the concrete



surface because the hollow brass control stem can be cut to appropriate size. The stem extends from the valve to a brass floor plate 3⅝ in. in diameter, marked to indicate open or closed position. This traffic plate fits flush with the concrete floor and can be operated by foot. A slightly different model also is manufactured for hand operation. These are designed to be located in a valve pit or off the floor in a cupboard or similar location.

The valve disc is built into a wrought iron body, made of a short piece of pipe end-beveled to facilitate welding into a section of the heating coil. Since the most popular sizes of wrought iron pipe used for radiant heating systems are 1 in. and 1¼ in., according to records of thousands of installations, Homestead Valve Co. is manufacturing Radiantrol valves in the 1¼ in. size, which is adaptable to both 1 in. and 1¼ in. pipe. Additional sizes will be added later as the demand warrants.

Automatic Purifier

BAKER & CO., INC., Newark 5, N. J.

MODEL: Deoxo Puridryer.

APPLICATION: For automatic removal of oxygen impurities and moisture from gases. Considered essential for atmosphere furnace application, it is also recon.mended for use in such fields as powder metallurgy, brazing, heat treatment, food processing, hydrogenation, and vacuum tube manufacturing.

DESCRIPTION: Installed at any convenient point on the low pressure line, the Puridryer purifies such gases as hydrogen so that less than one part in a million of oxygen impurities remains, and then it dries the gas to dew points of better than —50°F. It may also be used with such gases as nitrogen, argon, neon and saturated hydrocarbons.

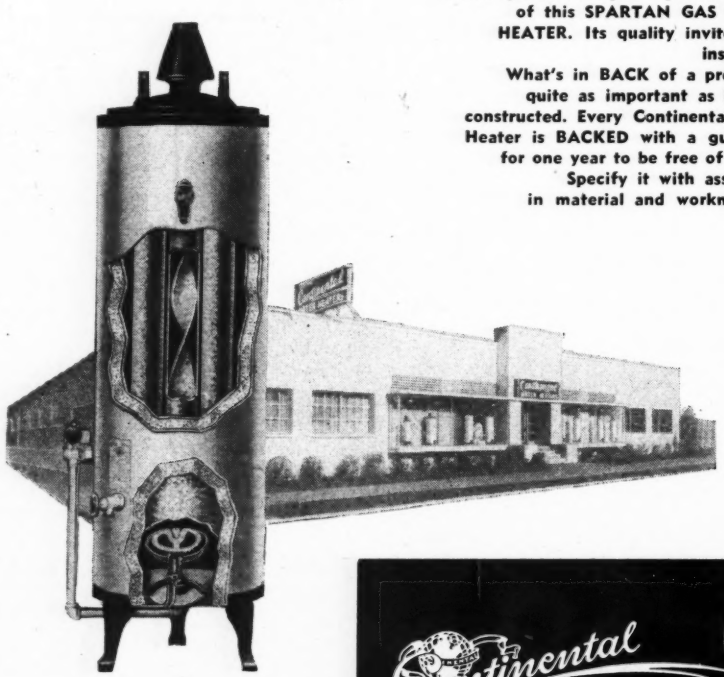
There are two operating dials and a green pilot light on the black housing. To reactivate, the upper dial is turned to close off gas flow to the furnace. The lower knob starts the timing cycle, heats the drying chamber and allows a small flow of gas to pass through the dryer. The small gas stream becomes saturated with moisture before passing through a

FRONT and BACK

We're proud to open up the FRONT of this SPARTAN GAS WATER HEATER. Its quality invites close inspection.

What's in BACK of a product is quite as important as how it's constructed. Every Continental Water Heater is BACKED with a guarantee for one year to be free of defects in material and workmanship.

Specify it with assurance!



Continental Water Heater Company Ltd.

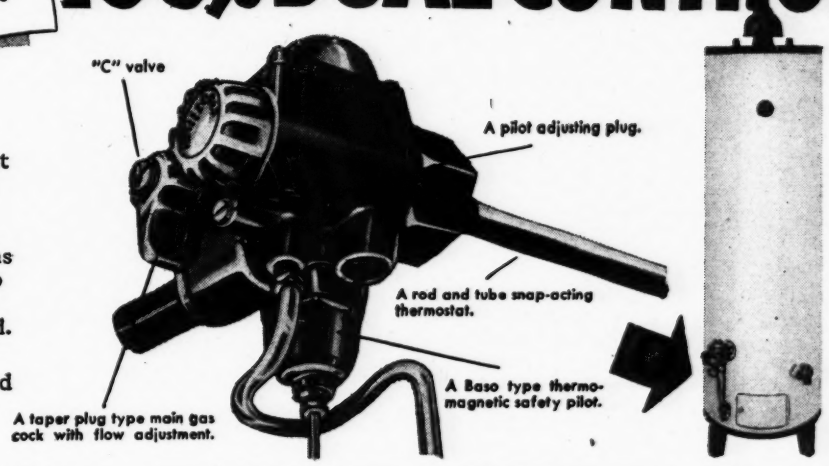
LOS ANGELES • SAN FRANCISCO

NOTE TO EXECUTIVES:
This is the first in a series of advertisements which describe the operation and service of Rheem simplified engineering features for gas-fired appliances. The data is taken from the comprehensive instruction and service manual which is attached to every product. If you would like to make this booklet available to your service personnel, at no cost, simply mail the coupon below.

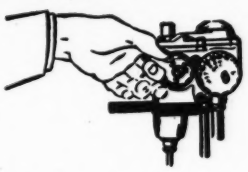
The RHEEM 100% DUAL CONTROL

This compact, patented control is standard equipment on Rheem automatic gas water heaters with the exception of the Series 20 economy model. It guarantees safety because it automatically shuts off all gas if the pilot light is extinguished... it also makes it impossible for gas to flow to the burner while the pilot is being lighted.

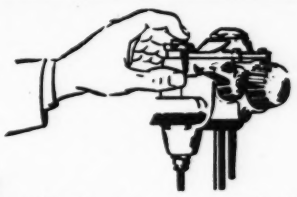
The Rheem 100% Dual Control consists of four separate units contained in one casting:


"C" valve
A pilot adjusting plug.
A rod and tube snap-acting thermostat.
A Baso type thermo-magnetic safety pilot.
A taper plug type main gas cock with flow adjustment.

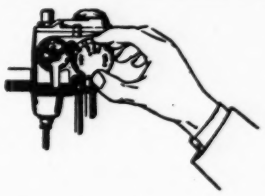
TO OPERATE



1
Set lever accurately at "pilot". Depress pilot reset button down to the cap nut.



2
Keeping button depressed, light pilot. *Continuing holding button for 2 minutes.* Release the pilot button.



3
Now turn the lever to "on". Turn dial to desired temperature.

TO SERVICE

IF THE PILOT LIGHT GOES OUT, CHECK:

1
SIZE OF FLAME. If the pilot light does not envelop the thermocouple, it must be adjusted. Remove the screw cap and turn the small screw underneath.

2
POSITION OF LEVER. Was "pilot" set in dead center of indicator button? If not, pilot reset button could not have been fully depressed.

3
CONNECTION OF THERMOCOUPLE LEAD TO MAGNETIC VALVE. Is this double-thread connection tight? If not, tighten it firmly.

Complete data for operation and service of the Rheem 100% DUAL CONTROL is contained in an attractive, clearly illustrated manual. If your service men are acquainted with this information, it may save them time and labor in the field. Just indicate the number of copies you need and mail this coupon.

Rheem
Automatic Gas-Fired Appliances

Rheem, Dept. R-C11
570 Lexington Avenue, New York 22, N. Y.

Please send me ( )copies of your Instruction Manual on the Rheem 100% DUAL CONTROL, at no cost.

NAME.....

TITLE.....

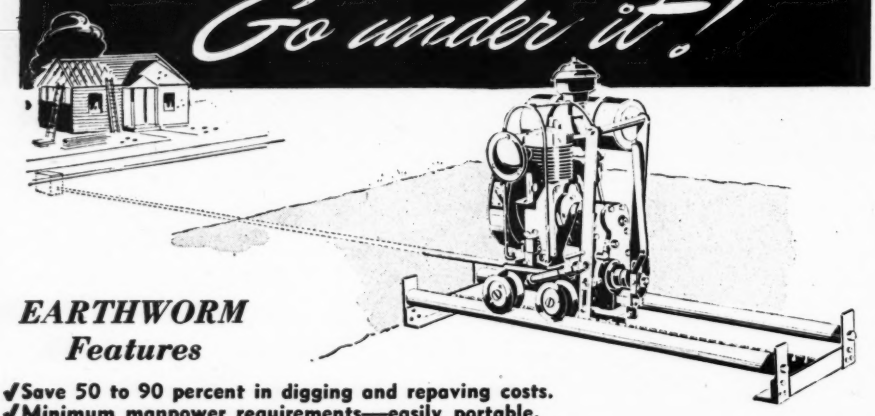
COMPANY.....

ADDRESS.....

CITY.....STATE.....

DON'T DIG UP THE STREET

Go under it!



EARTHWORM Features

- ✓Save 50 to 90 percent in digging and repaving costs.
- ✓Minimum manpower requirements—easily portable.
- ✓Easily operated—straight line accuracy in boring to given point.
- ✓Minimum street openings. Manual feed warns of underground lines.
- ✓Quickly pays for itself—average boring speed, 1½ ft. per min.
- ✓Complete unit—requires no auxiliary equipment.

3 Models — Write for delivery and operating instructions.

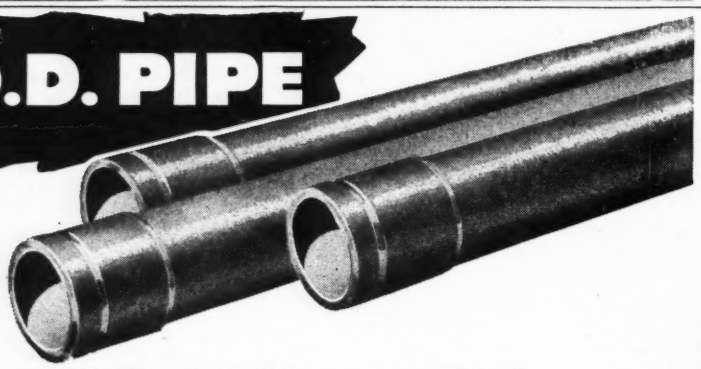
Over 60 percent of our post-war production has been purchased by pre-war users.

Mailing Address: BOX 1100

Earthworm

BORING MACHINE • MANUFACTURED BY LUBE JACK CO., SANTA MONICA, CALIF.

6" O.D. PIPE



Over ½ million feet plain or grooved ends.
50,000 feet 1", large stock of 2", 3", 3½" and 4".

Pipe • Tubes • Valves • Fittings

Size ⅛" to 40", lightweight, Standard, X Heavy, XX Heavy and Irrigation Pipe.

Steel Plates, Bars and Rounds, Welding Supplies, Construction and Mining Equipment and Supplies. Hi-Speed Drills, Electric Motors and Accessories. Many Other Items.

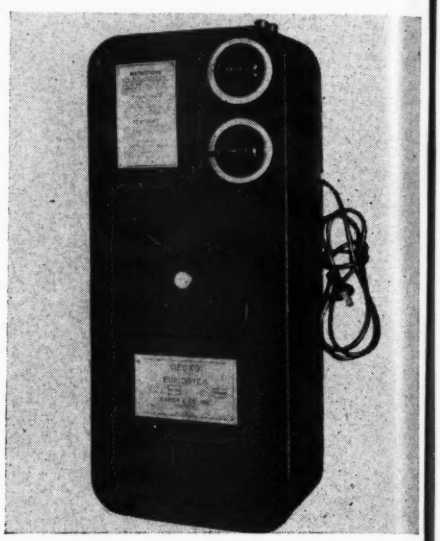
We Purchase and Dismantle Refineries and Pipe Lines

LAWRENCE PIPE COMPANY

5030 LONG BEACH AVE • LOS ANGELES 11, CALIF • Kimball 1234

newly-developed Deoxo Converter, which combines the purging gas with the water vapor so that only water vapor will be expelled to the atmosphere. When reactivation is complete, the green light glows to indicate the unit is ready for use.

Capacity of the unit depends upon the moisture content as well as impurity of



the incoming gas, which varies with each installation. Technicians caution users not to subject the Puridryer to pressures in excess of 5 psig. The catalyst used in the purification phase never requires reactivation unless poisoned by sulphur compounds, carbon monoxide, or some organic solvent vapors.

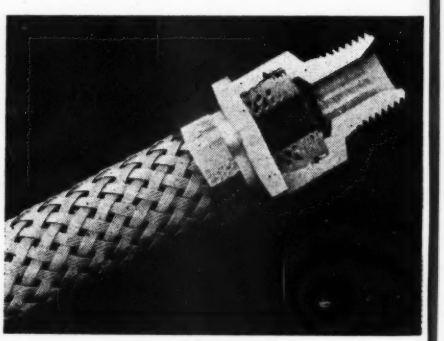
Flexible Metal Hose

THE BROCKWAY CO., Naugatuck, Conn.

MODEL: Uniflex seamless flexible metal hose and fitting line.

APPLICATION: For long life and maximum maneuverability using manufactured or natural gas.

DESCRIPTION: A special alloy seamless bronze tube, fabricated into this



uniform helically corrugated, flexible hose, retains the characteristics of the original tube. The resultant hose is a resilient, seamless product that is leakproof.

To prolong life and prevent elongation, the Uniflex metal hose is encased in a high tensile bronze wire braid. This sheath is permanently attached to couplings. The Uniflex fitting provides metal-to-metal seat by means of a seal produced between the fitting body and the spring washer effect of the hose itself.

PEOPLE

BRUCE K. BROWN, president of Pan-American Petroleum Corp. of New Orleans and vice president and director of Standard Oil Co. of Indiana, was elected chairman of the Military Petroleum Advisory Committee at its organization meeting on July 9, it was announced recently by Vice Admiral John H. Hoover, chairman of the Army-Navy Petroleum Board and Max W. Ball, director of the Oil and Gas Division, Department of the Interior. The Military Petroleum Advisory Committee was created by the Secretary of the Interior at the request of the Secretaries of War and Navy to study the petroleum aspects of military plans and problems and to provide the Army-Navy Petroleum Board and the Oil and Gas Division with expert counsel, advice and information. The committee is composed of 15 outstanding members of the oil and gas industry. Brown has had extensive experience in the oil business and in government service as a technologist and petroleum executive. During the war, from 1941 to 1945, he was assistant deputy administrator of the Petroleum Administration for War, in charge of the government-industry cooperative program by which the production of aviation gasoline was increased from less than 40,000 to more than 500,000 barrels per day.

N. HENRY GELLERT has resigned as president and director of the American States Utilities Corp., as president and director of Southern California Water Co., and also as chairman of the board of directors of the Edison Sault Electric Co. The latter two are subsidiaries of American States. His resignation became effective at the end of business on July 31, 1947. The Board of Directors of the American States Utilities Corp. has not picked a successor as president or director.

Gellert announced the election of C. Prugh Harnish, executive vice president of the Southern California Water Co., as his successor with the title of president and general manager. The necessity of his full time, as president of the Seattle Gas Co., has made this step necessary.

HARRY W. SMITH, JR. has formed a specialized firm in the publicity field to produce technical material addressed to commercial, industrial, and engineering readership. Smith, who will serve as president of Harry W. Smith, Inc., has written profusely on technical news handling since 1939 as president and director of technical news for John Mather Lupton, as manager of technical information for the Selas Corp. of America, and as director of industrial and commercial publicity for the American Gas Association.

BERNARD S. RODEY, JR., assistant secretary and manager of the tax department of Consolidated Edison Co. of New York, Inc., heads a list of public utility executives who were elected vice presidents of the local controls of the Controllers Institute of America in their respective cities. Others were LESTER M. LaPORTE, controller of Wisconsin Electric Power Co., Milwaukee; and HAROLD E. JACKSON, comptroller and assistant treasurer of Southern Natural Gas Co., Birmingham.

At the annual meeting of the Dallas Control, CLARENCE C. HERRMANN, controller of Southwestern Gas and Electric Co., Shreveport, was chosen second vice president. A. E. ELLIOTT, treasurer of Louisiana Power & Light Co., was similarly honored by the New Orleans Control.

Members of the industry who were elected directors by the local controls of the Institute in their respective cities include: Lester E. Reynolds, auditor and assistant treasurer of the Connecticut Light and Power Co., Hartford; R. L. McVey, assistant to the president of Tennessee Gas Transmission Co., Houston; Gerald L. Andrus, controller of New Orleans Public Service, Inc., New Orleans; and J. H. Clawson, controller and acting treasurer of Puget Sound Power & Light Co., Seattle; Norman F. Paxton, assistant secretary and assistant controller, Panhandle Eastern Pipe Line Co., Kansas City.

Frank L. Griffith, vice president and controller of The Peoples Gas Light & Coke Co., Chicago, was re-elected a director of the Chicago Control. Ernest G. Kellett, assistant secretary - assistant general auditor of Northern States Power Co., Minneapolis, was re-elected a director of the Twin Cities Control.

CECIL M. DUNN has been advanced to the newly created position of director of sales and advertising of the Estate

ARCCO
ARCCO-MACNICK
"SPEED-LOK"
CHART
HUBS
Never get lost!
Now under production and ready for immediate delivery, the NEW Arcco-Macnick "Speed-Lok" Chart Hub will save valuable time in changing charts. ● Simple to operate with no cap or loose parts to become damaged or lost, this new hub locks the chart securely in the DESIRED POSITION without damage to center hole. ● Replace your antiquated two-piece hubs with the new Arcco-Macnick single unit "Speed-Lok" Chart Hub. Fits practically all tapered arbor chart clocks. Send for bulletin #114.
$1.50 (Lower prices in quantities)
AMERICAN
RECORDING CHART CO.
3113 E. 11th Street • Los Angeles 23, California
SEND FOR BULLETIN NO. 114

Heatrola division, Noma Electric Corp. Dunn has been general sales manager of this division for the past year. Previous to that, he was assistant sales manager and promotion manager.

As director of sales and advertising, Dunn is now supervising the company's enlarged advertising campaign and is expediting the establishment of a new program of sales-service. The executive sales offices of Estate Heatrola were transferred, as of July 1, to the factory at Hamilton, Ohio.

C. L. DALTON, president of the Oklahoma Natural Gas Co., has been elected to the board of directors of the Hospitalized Veterans' Foundation, which will take over the work of the wartime USO and provide bedside entertainment for disabled heroes. The non-profit, non-sectarian, non-political organization is headed by Jack Benny, radio and screen comedian. Sixty-five prominent Americans from all walks of life and all sections of the country comprise the board.

DR. BERNARD GOERG, nationally known authority on residential heating, has been appointed Chief Engineer of the Lawson Manufacturing Co., Pittsburgh, officials have announced. The Lawson Co. manufactures water and home heating equipment. Dr. Goerg begins his association with Lawson after more than 20 years with the American Radiator & Standard Sanitary Corp. From 1935 until this year, Dr. Goerg served as Director of the Institute of Thermal Research of A. R. & S. S. The work of the institute is primarily the development of new heating equipment for residential purposes. He received his Ph. D. degree from the University of Heidelberg and previous to his association with the A. R. & S. S. Corp. was connected with the Shipley Construction & Supply Co. and worked for three years on the development of the Bergius process for high pressure and high temperature hydrogenation of oil and coal.

W. D. McElroy

W. D. McELROY has been appointed manager of the Research and Development Division of the Pittsburgh Consolidation Coal Co. McElroy will be in charge of all pilot plant operations in the company's program of coal gasification. After his education in engineering and physics at West Virginia University, he became associated with the United Gas Improvement Co. of Philadelphia, where he spent 12 years in research and development work on a variety of problems in the gas industry. McElroy has been general superintendent of that company's Ugite plant No. 2, Chester, Pa., for the last seven years. His experience included work in the production of manufactured gas from coke and oil and the making of chemicals from petroleum.

WILLIS S. YARD, a past president of the Pacific Coast Gas Association, has assumed responsibility for all West Coast engineering for the Norwalk Valve Co. His headquarters will be at Norwalk's San Francisco office. Yard was for 16 years vice president of the Pacific Gas and Electric Co. in charge of gas construction and operation. While with PG&E he designed and installed the large natural gas lines to the San Francisco and Bay areas and had charge of the conversion of all gas-consuming appliances to natural gas. For many years he was also associated with the Seattle Gas Co. Yard is a vice president of the Gas Consumers Association. He received his formal education at the University of Utah and Cornell University.

C. F. Breer

C. F. BREER has been appointed sales manager of McCulloch Motors Corp., 6101 W. Century Blvd., Los Angeles. He has been assistant sales manager of the company for the past year. Breer will direct sales and advertising of the McCulloch lightweight industrial engines, as well as the target-aircraft engines built for the armed services. He will also head the sales of Haylo gas space heaters and other McCulloch consumer products. Before joining McCulloch Motors Corp. Mr. Breer was a naval officer attached to the Bureau of Aeronautics, and prior to the war, was with the Engineering Division of Chrysler Corp. in Detroit. He is a member of the Society of Automative Engineers.

The Keystone

to PROPER PIPE PROTECTION against CORROSION

HILL, HUBBELL
PRECISION APPLIED
COATING-&-WRAPPING

A Hill, Hubbell application of coating—and—wrapping on 16" O.D. pipe—welded together preparatory to ditching.

HILL, HUBBELL pipe protection engineers are not satisfied with just "good enough" coating—and—wrapping. They are constantly improving the machine application of enamel for greater time enduring resistance to electrolytic action.

Repeat orders, constitute sound assurance of the success our progressive efforts have attained.

Hill, Hubbell and Company
Division of GENERAL PAINT CORPORATION
3091 MAYFIELD RD. CLEVELAND, OHIO.

W. S. Hull

WALDO S. HULL is the new eastern representative and sales engineer for the Reynolds Gas Regulator Co. Hull recently resigned as Philadephia representative for Rockwell Manufacturing Co. Hull is a graduate chemical engineer from Rensselaer Polytechnic Institute. After three years as metallurgist with Remington Typewriter Co. at Ilion, N. Y., he moved on to Utica Gas and Electric Co. (now Central New York Power Corp.), where he was connected with all phases of gas engineering, to become superintendent of gas transmission and regulation. In 1942 Mr. Hull was loaned to WPB where he was senior industrial engineer in the Gas Materials Division of the Office of War Utilities. Hull comes to Reynolds with a wide experience and training in gas flow and control. He resides at 163 West Queen Lane, Philadelphia, where he will make his headquarters.

ROBERT W. MARTINDALE, WILLIAM G. SAVAGE, and THOMAS SIMONS of U. S. Pipe and Foundry Co., Burlington, N. J., retired on June 30. All three were sales managers in the Pacific Coast, Western, and Southern districts, respectively. Effective July 1, the following sales managers and assistant managers were appointed: Pacific Coast—A. RAYMOND HAUSMANN, manager; P. KING FARRINGTON, assistant manager. Western—CARL N. BROWN, manager; J. LESLIE HART, assistant manager. Southern—THOMAS W. McCREERY, manager; ROBERT C. LEMERT, assistant manager.

HENRY O. NORTON has been appointed a divisional sales manager for Bendix Home Appliances, Inc., according to W. F. Linville, general sales manager. Headquartering in Philadelphia, Norton contacts distributors there and in Baltimore, Norfolk, Richmond and Washington. A graduate of the University of Pennsylvania school of business administration, Norton was successively a sales representative of the Semet Solvay Co., salesman and sales manager of the Philadelphia division, Universal C. I. T. Credit Corp., and naval sales representative for E. G. Budd Manufacturing Co., Philadelphia.

A. M. KUEHMSTED, chief engineer for the Santa Fe Tank and Tower Co., Los Angeles, for the past 12 years, has been assigned to the New York branch. He will take over the district management of cooling towers, air cooled units, and wood tanks. His headquarters will be at 400 Madison Ave., New York City.

KEY W. RYAN has been appointed supervisor of sales and service for the South Wind Sealed Heat residential heating unit manufactured by Stewart-Warner Corp. Ryan, who joined the division in January, 1947, succeeds A. L. FOLLEY.

EARL STIEFEL is the new director of purchases of the Moore Division, Joliet, Ill., of the Conlon-Moore Corp. Stiefel was formerly purchasing agent of the Round Oak Stove Co., Dowagiac, Mich.

THE SMALL EXTINGUISHER..
WITH THE MIGHTY PUNCH!

FOR FIRE HAZARDS THAT DO NOT DEMAND LARGER EQUIPMENT . . .

The new ANSUL 4 Dry Chemical Fire Extinguisher has fire stopping effectiveness far in excess of any other extinguisher of comparable size. Its compact size makes it ideal for locations where space is limited. The ANSUL 4 is easy to use . . . easy to recharge on-the-spot . . . and again ready to

STOP FIRE FASTER!

MADE BY THE MAKERS OF ANSUL-DUGAS DRY CHEMICAL FIRE EXTINGUISHERS, MODELS 20, 30, 150A AND 350A.

ANSUL CHEMICAL COMPANY
FIRE EXTINGUISHER DIVISION, MARINETTE, WISCONSIN

The best possible insurance against defective thermostats

TYPE
IHF-22
A.G.A.
Certified

WELSBACH EMERGENCY GAS SHUT-OFF VALVE

The Welsbach patented Emergency Gas Shut-off valve acts positively before the water temperature reaches the danger point should the thermostat stick or fail to operate.

Approved and used by leading Gas Companies.
Available in ½" to 1½" I.P. sizes.

Ground key Gas Stops - Regular and High Pressure.
Meter Connections.

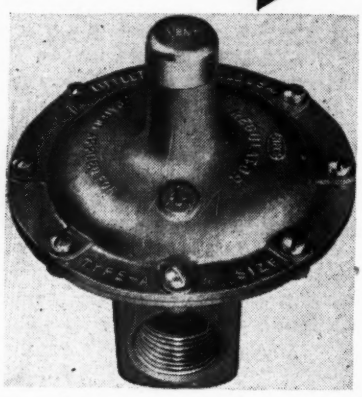
Write for descriptive literature and prices.

KITSON DIVISION
THE WELSBACH CORPORATION
1500 WALNUT ST. PHILADELPHIA 2

HECO'S *New* PRECISION DIE-CAST Gas Appliance REGULATOR

Designed, engineered and produced complete by Heco, units are individually tested to assure close control at minimum maintenance cost.

Available for Immediate Delivery



- **PRESSURE DIE-CAST FROM FINEST ALUMINUM ALLOY**
- **BRASS-TO-BRASS SEAT**
- **CORROSION-RESISTANT INTERNAL PARTS**
- **LOWER SHIPPING COSTS**
- **CLOSE CONTROL**
- **HIGH CAPACITY**
- **LOW MAINTENANCE**
- **INDIVIDUALLY TESTED**
- **APPROVED BY A. G. A.**

INSIST ON THE *New* HECO REGULATOR FOR PRECISION PERFORMANCE

New, too, is the line of HECO Precision Machined Brass Valves and Cocks. Write for prices, Catalog No. 47 G on the complete line, giving jobber's name.

TESTED AND ·HECO· PROVED PRODUCTS

HECKETHORN
MANUFACTURING & SUPPLY CO.
LITTLETON, COLORADO, U.S.A.

F. E. BESCHER has been named to succeed L. L. PERRY, who resigned, as business development manager of the Interstate Power Co., Dubuque, Iowa. Bescher has been connected with the utility business for the past 27 years, joining Interstate Power Co. in 1928. In 1933 he was appointed sales supervisor of the Dubuque district, remaining in that position until he was advanced to director of lighting in 1937, the office he held at the time of his recent promotion.

CARL J. DINIC has been appointed manager of commercial research for Rheem Manufacturing Co., according to a recent announcement by A. Lightfoot Walker, executive assistant to the president. Dinic will make his headquarters in the New York office. Prior to joining Rheem, he was with the American Locomotive Co., with United States Steel Corp. of Delaware and was formerly associated with Eastern Gas & Fuel Associates. He received his bachelor of science degree from the University of California and his master of business administration degree, magna cum laude, from the Harvard Graduate School of Business Administration.

C. J. Dinic

EDWARD NELSON, engineer with Northwestern Utilities, Ltd., since 1923, was recently presented at Edmonton with a gold watch on his retirement. He had been with the Natural Gas and Power Co. since its inception and was appointed chief engineer in 1925. He was one of the leading gas engineers in Alberta, and closely connected with natural gas development in that province. Prior to joining Northwestern Utilities, Nelson was a member of the Provincial Government staff.

GENE WALKER of Houston has been promoted from chief clerk in the purchasing department to purchasing agent in the general offices of the United Gas Corp. Walker's new duties include directing the buying of materials and supplies for the corporation in Texas, Louisiana and Mississippi. He succeeds A. T. JOHNSON, JR., who has been transferred as sales manager to Mississippi.

J. PAUL AHLBRANDT has been appointed to the newly created post of director of manufacturing for the Hamilton Manufacturing Co., Two Rivers, Wis., according to an announcement by E. P. Hamilton, president.

Ahlbrandt's first responsibility will be the supervision of the layout and construction of a new two-story plant addition which will provide increased facilities for the manufacture of Hamilton automatic home clothes dryers.

With a technical education obtained at Carnegie Tech in engineering and the University of Cincinnati in business finance, he has specialized in modern manufacturing techniques throughout his professional career. He had been employed previously by Midwest Manufacturing Co., American Rolling Mill Co., and Borg-Warner Corp. During the war, he served the War Production Board as a production analyst. He comes

to Hamilton from the position of assistant to the vice president in charge of manufacturing of Bendix Home Appliances.

- OBITUARIES -

HENRY MORRISON REED, 66, chairman of the board of American Radiator & Standard Sanitary Corp., died in Pittsburgh Aug. 12 after a long illness. Reed's entire business career was devoted to American-Standard and its predecessor companies. He joined Standard Manufacturing Co. in 1901 while still going to school, and was advanced from the packing department to the following positions: enamel mixer; superintendent of the enamel mixing department; manager of the Louisville, Ky., works—largest manufacturing unit of Standard Sanitary Mfg. Co.; assistant manager of factories; member of board of directors; president of Standard Sanitary and vice president of American-Standard; chairman of the board and president of American-Standard.

HERBERT J. DRANE, a member of Congress for 16 years and a member of the Federal Power Commission from 1933 to 1937, died on Aug. 11 at the age of 84. Drane served for 15 years in the Florida legislature and was president of the state senate for two years. President Roosevelt appointed him to the FPC and, after retiring from that post, he returned to his home in Lakeland, Fla.

I. J. UNDERWOOD, 55, prominent Tulsa attorney and general counsel for the Oklahoma Natural Gas Co., died July 10, from a heart attack at West Point, N. Y., while visiting relatives. He has represented the Oklahoma Natural Gas Co. in legal capacities since 1925.

HARRY A. GRAHAM, 58, auditor of the Iroquois Gas Corp. of Buffalo for 20 years, died recently of a heart attack in his home. Prior to joining Iroquois, Graham was auditor of the United National Gas Co. in Oil City, Pa.

GUSTAVE J. THOMPSON, formerly southwestern manager of Ruud Water Heater Manufacturing Co. with headquarters in Dallas, passed away at his home in Dallas recently. Thompson had been ill for several years.

SALES SLANTS

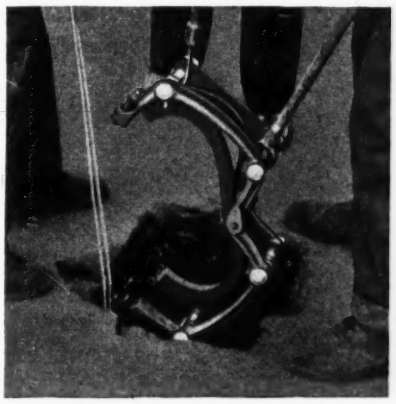
Certified Kitchens

The New Freedom Gas Kitchen Bureau has released ammunition on its Certified New Freedom Gas Kitchen program with which local gas companies and appliance manufacturers may begin firing the merits of the plan at architects, builders, dealers and customers. It works like this:

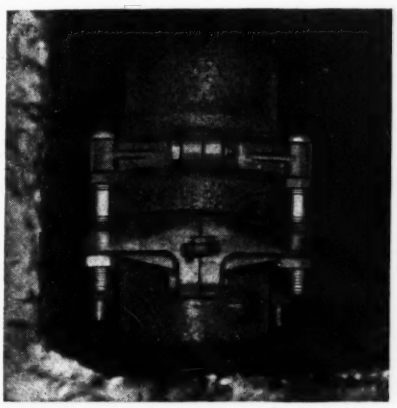
For kitchens—new or remodeled—where certain national and local requirements have been met, an engraved certificate will be issued to the customer by name and street number. This certificate will appeal to the customer's pride of ownership and will serve the builder as an endorsement of the quality he has put into his kitchen, implying that he has used similar good judgment throughout the house. This plan provides the basis for consultation with architects, builders, jobbers, dealers, and manufacturers' representatives, all of whom have a stake in it. Gas companies

NORMAC
BELL JOINT CLAMP

6 inch NORMAC clamp being lowered into hole for installation



6 inch NORMAC clamp in service after installation



Solves Your Joint Repair Problems

- QUICK
- EASY
- PERMANENT

Installed in pavement openings 1' x 1'. Available in all standard sizes from 3" to 12". A simple set of tools cleans the joint, installs the clamp . . . often in only a quarter of an hour. SAVES TIME. SAVES MONEY and the repair is permanent. Designed for all conditions particularly where pavement repair costs are prohibitive. Write for literature illustrating this simple solution to one of the Gas Industries most trying problems and ask for our catalog describing our complete line of

COUPLINGS . . . FITTINGS
SERVICE TEES and ELLS
SLEEVES . . . COMPRESSION-END COCKS . . . COMPRESSION-END METER BARS

NORTON-McMURRAY MFG. CO.
39 SOUTH LA SALLE ST. • CHICAGO 3, ILL.
Method and product covered by U.S. Patents, Nos. 2,163,261 and 2,178,286.

CONNELLY IRON SPONGE

For Real Gas-purifying Power

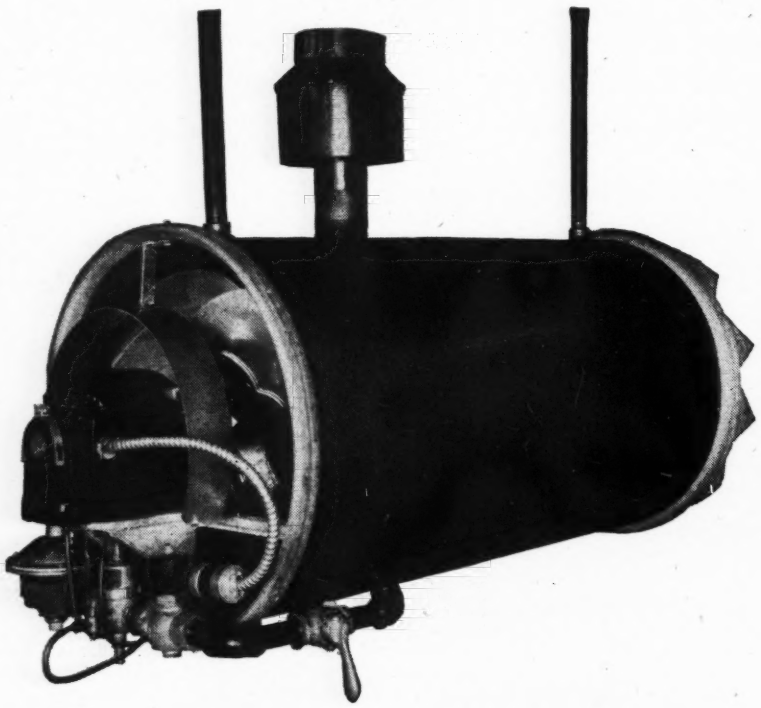
To get top efficiency in gas-purification at the lowest cost, use Connelly Iron Sponge. It's the finest purification material to be had.

Connelly Iron Sponge has a high degree of activity. It gives longer service before fouling. It revivifies more quickly. Leading gas companies have been using this "blue-ribbon" purification material for years — they know it can be relied upon to do the best job.

If you have a problem in gas-purification, take advantage of Connelly's 71 years of experience. Our engineers will be glad to help you . . . there is no obligation. Consult Connelly!

CONNELLY, INC.
3154 S. California Ave., Chicago 8, Illinois
Elizabeth, N. J. Los Angeles, Calif.

JOHN ZINK'S



New UNIT HEATER

This new and unique design in suspended space heaters features: More Head Room — Compact Design — Less Noise — More Heat from Gas Burned.

Where floor space is at a premium this turbine type unit has greater heating capacity. Controls are built in. One unit will heat a 40'x80' space. It is A.G.A. approved for liquefied petroleum gases, manufactured, mixed or natural gas. Unit shipped completely assembled ready for installation.

ADJUSTABLE LOUVERS AVAILABLE IN THREE COLORS

—Write for Literature—

JOHN ZINK COMPANY

4401 S. Peoria -:- Tulsa 1, Oklahoma

New York - Salt Lake City - Houston - Los Angeles

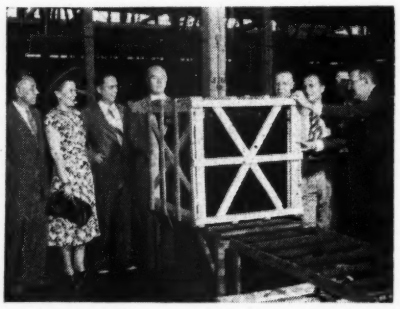
and dealers are urged to use all promotional materials available from the kitchen bureau and from GAMA, as well as local advertising, model kitchen display, or a model home.

Certification requirements for a New Freedom Gas Kitchen are: (1) Scientific planning for efficiency and beauty. (2) Automatic gas range built to "CP" standards. (3) Automatic silent gas refrigerator. (4) Automatic quick-recovery gas water heater.

Each gas company will choose one person to conduct the program in its locality. He will confer with the local architect, builder, and dealer; assist in the planning; and arrange for issuance of certificates.

The bureau has prepared a brochure explaining the plan and suggesting methods of promoting it locally. A large sign reading "Another Nationally Advertised New Freedom Gas Kitchen Being Installed Here—Planned for Labor Saving Efficiency, Automatic Gas Cooking, Silent Gas Refrigeration, Automatic Gas Hot Water Service," to be erected in front of the home where a certified kitchen is being installed, is one of the suggested promotional ideas. Local dealers furnishing appliances and services are listed on the sign.

AMERICAN STOVE CO.'s new million dollar plant, a former war production facility, has been designed and equipped to produce at a rate of between two and three times that of prewar production schedules. Magic Chef heavy duty gas cooking equipment began rolling from the new assembly lines on



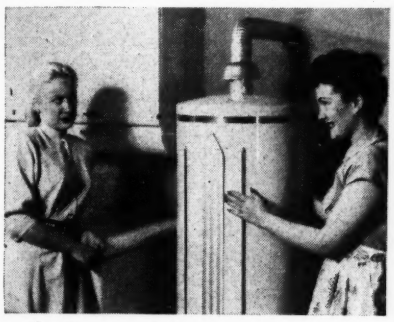
July 16. The photograph above shows company officials and guests stopping the first heavy duty range assembled on the new line. Left to right: Karl Emmerling, East Ohio Gas Co.; Jean Clarke Thompson, AGA publicity; Bruce R. Tritton, American Stove vice president; W. H. Frick, heavy duty sales manager; A. W. Leeseberg, plant manager; S. J. Szabo, assistant plant manager; Virgil Stakely, production control supervisor, and Lloyd C. Ginn, sales promotion manager.

FENTON KELSEY CO., Madison, Wis., has printed a four-page folder on water heating and sanitation in restaurants designed to emphasize the need for better restaurant sanitation and to show how gas water heaters can do the job. The folders may be obtained with company imprint on the back page and self-mailer on the cover. "Disease a' la carte," an article which first appeared in a woman's magazine and again in the August issue of "Reader's Digest," has called national attention to the need for 180° water in restaurants.

GAMA REPORTS increases in shipments of domestic gas ranges and automatic gas water heaters during the first six months of 1947. Range shipments, valued by the manufacturers at about $94 million, totaled 1,116,000 units. This is 336,700 units more than we shipped during the same period in 1946 and only 10,600 units less than 1941, the industry's peak year. GAMA's figures show that 25.5% of the gas range shipments were for use with LP-Gas. It is estimated that shipments of electric ranges during the first half of 1947 totaled 575,000 units.

Water heater shipments, valued at about $42.8 million by the manufacturers, totaled 937,700 units, exceeding by 410,700 the number shipped during the same period in 1946, and by 548,900 the half-year deliveries in 1941. Indications are that 22.4% of the 1947 shipments were destined for LP-Gas use. Electric storage water heater shipments for the period are estimated at 550,000 units.

PORTLAND GAS & COKE CO. has produced "Hot Water Helps," a 14-minute sound slide film designed to promote automatic gas water heating, a not easily demonstrated service. Original cost of the production was about $2000, according to Fred M. Kimball, promotion manager. He outlined four basic aims for the film, as follows: (1) To include purely educational material so that



an audience would not leave with the feeling of having received only a sales talk. (2) To promote additional use of hot water even by those already having automatic water heating. (3) To sell automatic gas water heating even to the point of including gas-fired tank water heaters as competition! (4) To promote automatic gas-fired clothes dryers as a powerful ally to the automatic gas water heater in keeping the domestic load well balanced in favor of gas. In the above scene from the film Mrs. Reade enlightens her visitor, Mrs. Grayson, about automatic water heating.

SURFACE COMBUSTION CORP. has developed a plan for increasing equipment sales even though restrictions have halted most conversions of coal and oil heating equipment. The "up-grading" plan revolves around the idea that even though you can't convert, you **can** replace. The first step is a phone call or salesman's visit to present gas heat users whose names can be obtained from the local gas company, promotional mailings, or a telephone canvass. Prospects may then be followed up by personal interviews. A card record of each call may have sales possibilities when restrictions are removed. One salesman conducted a contest to find the oldest gas-burning equipment in Cincinnati, offering a new conversion burner as a prize. The list of "losers" was, naturally, a very valuable prospect list.

REPUBLIC STUDIOS' officials and stars are convinced that "Gas Has Got It!" Whenever a food or eating sequence arises during the filming of a picture, a mobile kitchen on wheels, consisting of a gas range, gas refrigerator and a sink unit mounted on a 12-ft. dolly, is wheeled on the stage and plugged into flexible connections. Food is kept piping hot or crisply chilled during an entire day of shooting. Between scenes, the kitchen is used to prepare snacks for the company. In addition to its use in preparation of food, the appliances frequently hold leading parts in actual kitchen scenes.

BENDIX HOME APPLIANCE INC., has announced the invention by Fred Norton, serviceman for The Kansas Electric Power Co.'s office at Parsons, Kan., of a sight glass assembly designed to convince customers who question whether the Bendix washes clothes clean. Through a cylinder of heat-treated glass 2 in. in diameter and 3½ in. long the operator can see the dirty wash water as it flows to the drain and note that successive rinse waters become clearer. The sight glass is free of water except during drain periods.

AGA HAS A SUPPLY of book matches featuring the New Freedom Gas Kitchen, printed in bright colors with space available for imprinting a name or local slogan. Minimum order with imprint is one case of 2500, priced at $5 per thousand, fob factory, including imprint.

The one gas odorant with all the Advantages

Captan

gas like smell
high odorizing value
non fading
uniformity
availability
expert help in use of Captan

NATURAL GAS ODORIZING CO. INC.
7620 wallisville road
HOUSTON 10, TEXAS

AGA HAS ANNOUNCED the availability of two new ads featuring the bathroom and the kitchen. They are designed to tie in with the fall "Gas Has Got It!" campaign. Newspaper mats may be ordered from AGA headquarters under the titles "10 Reasons Why It's America's Easiest Kitchen to Cook In" and "Before You Treat Yourself to a Bathroom Like This."

BENDIX HOME APPLIANCE, INC., South Bend, Ind., has launched a 4½-month campaign to sell more than 200,000 automatic washing machines. A sales army of over 20,300 is competing for a million dollars' worth of prizes. For the retail salespeople in dealers' stores there will be 213 major prizes valued at $45,000 to be awarded for "the most important and significant contributions to the art of selling Bendix automatic washers."

Wholesale dealers and distributors who chalk up the best sales will receive all-expenses-paid trips to winter vacation resorts in January. For distributors' sales managers there will be popular-priced automobiles to reward outstanding effort. Distributorships and dealerships have been divided into four sections so that those of similar market potential will be competing.

A. O. SMITH CORP., Milwaukee, has announced establishment of a 24-hour off-the-shelf service on water heaters, coal stokers, welding equipment, electric motors, pumps, and meters to its customers in all parts of the U. S. through a Product Service division. The division's first unit is in operation in Newark, N. J., and others are being established in Chicago and Los Angeles. Division manager is John J. Bohmrich.

In addition to providing replacement parts, the division will carry on actual production operations in the repair of damaged products and parts. It will make its own claim adjustments, provide needed field service, make field surveys, and even assist distributors in putting on sales clinics and demonstrations. There will be over 100 employees in the division. Paramount goals are to be fast service and low cost.

KALAMAZOO STOVE AND FURNACE CO. recently issued a 23-page booklet titled "A Cook's Tour of Your New Kalamazoo." It was devised to intrigue the housewife into 'reading necessary instructions on her new range by interspersing cooking hints, hot weather shortcuts, and baking check lists, along with directions for removing burner heads or having the gas flame adjusted. For anyone with a specific problem, there is a reference index at the front of the booklet.

AN AGA release states that industry executives have announced the availability of year-round air conditioning units for small or large residences after 13 years of development and testing, including work done under actual operating conditions in more than 100 homes. Consensus of opinion at a recent meeting of top gas utility executives in New York, one of several meetings to be held throughout the country, was that immediate promotion of all-year gas air conditioning should be launched by the industry.

HAMILTON MANUFACTURING CO., Two Rivers, Wis., has selected the Milwaukee area for the first of a series of localized advertising and sales campaigns on its automatic clothes dryer. First public announcement was a full-page newspaper ad by three Milwaukee stores, offering housewives immediate delivery of the improved postwar dryer. The new models embody many improvements in design, speed and efficiency of drying, and fully automatic controls, according to the manufacturer.

ARKANSAS NATURAL GAS CORP.'s Tom Quinn, sales supervisor of the new business department, recently sold 29 apartment house model Servel refrigerators to the Wales Apartments in Shreveport, chalking up the largest single sale since postwar salesmanship went into action. Quinn reports that the total gas bill for the operation of the 29 Servels will run about $14.50 per month, or a maximum of 50 cents per unit per month.

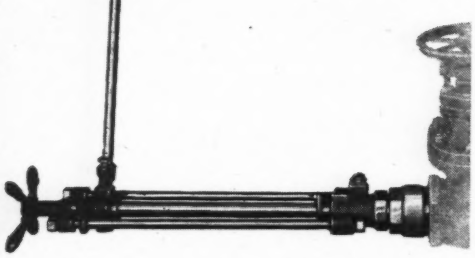
FOR SALE

ARMY SURPLUS TWIN UNIT GAS HEATERS WITH FANS, 245,000 Btu each, priced to sell. P.O. Box 348, Hartford City, Indiana, Phone 313 or 719.

WANTED

A well-qualified man for supervision of Production and Distribution of artificial gas. No managerial or commercial experience necessary. Should be over forty (40) years of age and should have had ten (10) years' practical experience in production and distribution. Box 200, 1709 W. 8th St., Los Angeles 14, Calif.

what do we mean by N



WE MEAN . . . the Model "N" . . . an extremely rugged, compact and light weight Drilling Machine for drilling through gate valves and fittings from 2" to 4" inclusive. Handles any working pressure up to 500 lbs. Write for detailed information.

MUELLER CO.
DECATUR, ILL. LOS ANGELES, CAL.

FOR SALE

MUNICIPAL GAS UTILITY

Sealed Bids will be received for the sale of a gas utility at the City Hall, 304 N. Huron St., Ypsilanti, Michigan, until 11:30 a.m. EST Monday September 15, 1947 and will be opened at the City Council meeting at 8:00 p.m. on the above date at the above address.

This gas utility is located in Ypsilanti, Michigan, which is 30 miles west of Detroit and 2 miles west of Willow Run.

Annual Send out capacity	2 million cubic feet
B.T.U. value	530
Number of meters	3132
Gas mains (3 inch equivalent)	59.4 miles
Holder capacity	300,000 cubic ft.
Relief holder capacity	60,000 cubic ft.
Water gas set	8 ft. diameter
Three (3) coal gas benches with six (6) retorts each (11'6")	
Population served	18,000
Population within 4-mile radius	40,000

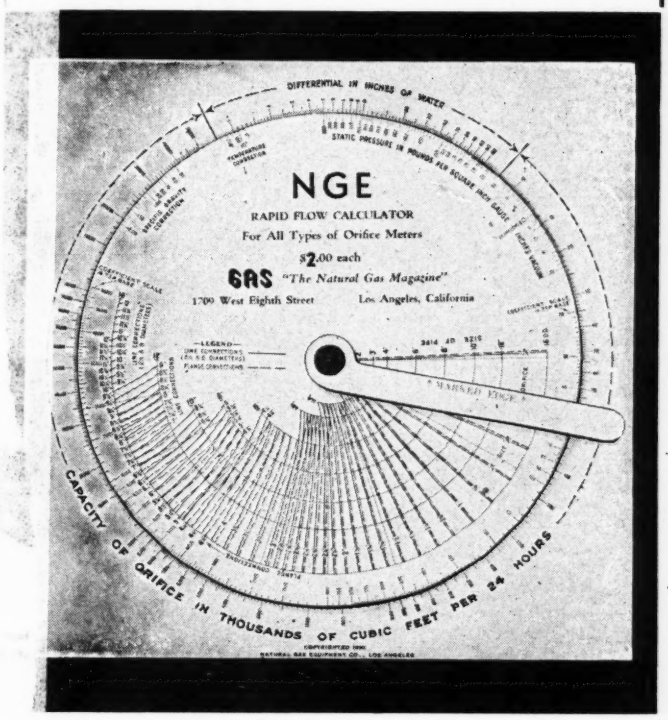
Ypsilanti is a rapidly growing community and offers a magnificent opportunity for an alert and aggressive gas utility operator.

The City of Ypsilanti reserves the right to reject any and all bids.

NGE RAPID FLOW

CALCULATOR

FROM 2 inches TO 16 inches


DIFFERENTIAL IN INCHES OF WATER
STATIC PRESSURE IN POUNDS PER SQUARE INCH GAUGE
NGE
RAPID FLOW CALCULATOR
For All Types of Orifice Meters
$2.00 each
GAS "The Natural Gas Magazine"
1709 West Eighth Street Los Angeles, California
CAPACITY OF ORIFICE IN THOUSANDS OF CUBIC FEET PER 24 HOURS

. . will quickly compute any of a series of variables in the transmission of natural gases.

IMPLE to operate: Set dial . . . Turn indicator . . . d *instantly find*

COEFFICIENT and VOLUME
CORRECT ORIFICE SIZE IN ANY GIVEN VOLUME
DIFFERENTIAL PRESSURES

ur NGE CALCULATOR has been tested in field and desk e. Why not let it *help you* with your daily problems. interested send in coupon and you will receive our alculator in a few days.

GAS
1709 West Eighth Street
Los Angeles 14, California

$2.00 EACH
25% discount on all orders for 25 or more

Gentlemen: Please send me.....NGE *Gas Flow Orifice Calculators* for which I am enclosing my check or money order for $..... *Add 2½% sales tax in California.*

NAME .....

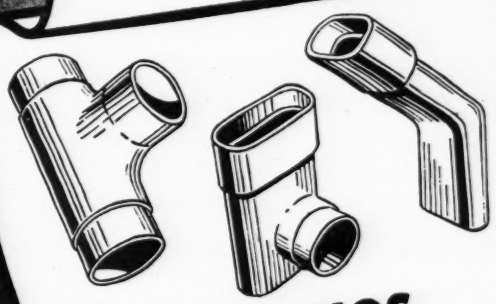
COMPANY .....

ADDRESS .....

Johns-Manville TRANSITE FLUE PIPE

for domestic gas-burning appliances

EASY TO INSTALL
comes in both round and oval shapes



FITTINGS for EVERY PURPOSE

and it's an asbestos product

COMPLETELY RUSTPROOF!

Write for our brochure TR-13A.
Address
JOHNS-MANVILLE
Box 290, New York, N. Y.

JOHNS-MANVILLE JM PRODUCTS

First IN Quality

Peerless ★ Circulators ★ Gas Heaters

63 years of Peerless research in the Science of Heating and its allied problems of Engineering, Design, Styling and Finish has resulted in today's outstanding quality heating equipment.

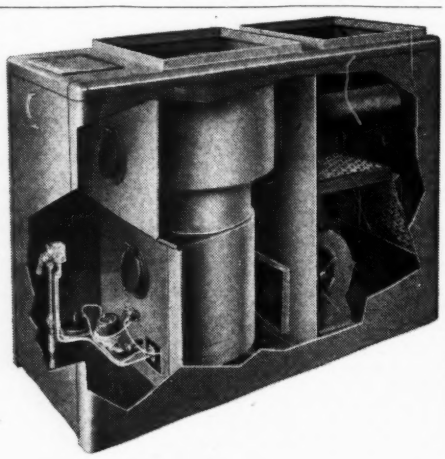
The Peerless line is . . . *made to sell . . . made to satisfy . . . made to last.*

Peerless
MANUFACTURING CORPORATION
INCORPORATED
LOUISVILLE, KENTUCKY

Announcing

GORDON BYRAND

Spreader Flame
series SFA
GAS FIRED
WINTER
AIR CONDITIONING
UNITS



Designed to provide complete automatic temperature and humidity control plus filtered circulated air. Built in sizes from 65,000 to 125,000 BTU per hour output. Famous Gordon Spreader-Flame Burner assures extreme fuel economy. Incorporates the dependable Gordon Pilot assuring immediate ignition of burner so long as any size flame is maintained in part actuating the element. Write for details TODAY.

ROBERTS-GORDON APPLIANCE CORP.
137 Arthur Street • Buffalo 7, N. Y.
Pioneers of the gas conversion industry and makers of "84", "302-20", "400" and Nordensson conversion burners

AMERICAN RADIATOR & STANDARD SANITARY CORP. has announced the availability of 10 unit displays to be used in the salesrooms of wholesale distributors and retailers to show heating equipment and plumbing fixtures to their best advantage. The displays consist of gray and coral panels which, easily and quickly assembled, form colorful backgrounds for complete groups of fixtures. Twenty displays can be built from the 10 units. A booklet entitled "Unit Displays" has been published by American-Standard to describe the versatility of the units and to aid in arranging layouts.

CURRENT READING

Glossary of the Mining and Mineral Industry—Albert H. Fay, Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C Republished by the Bureau of Mine from the original work, Bulletin 95 an authoritative dictionary containir some 20,000 technical and local terr relating to metal mining, coal minir quarrying, petroleum and natural g production, metallurgy, and geology, a the names of common, useful mine and rocks. It also contains many te relating to ceramics and the clay in try, glass making, foundry practice, way and building construction, elect installation and power-plant equipr and chemical terms concerning m lurgical practices. Price, $1.75.

List of Patents Assigned to the retary of the Interior and Availabl Licensing—Copies of this list are a able from the U. S. Dept. of the Int Office of the Solicitor, Washingto D. C. Licenses are customarily issue a nonexclusive, royalty-free basis. plications for licenses should be mad the above address. The Dept. of Interior does not have copies of t patents for distribution, but they ma be obtained from the Patent Office a 25 cents per copy.

Engineering Data and Reference Table—Leslie Co., 92 Delafield Ave., Lyndhurst, N. J., manufacturers of pressure and temperature regulators and controllers. This new 12-page bulletin No. 467 is an aid to the engineer in laying out piping and associated equipment. It is also a collection of information for calculations on piping, pumps, heaters, traps, reducing valves, temperature regulators, pump governors, pressure controllers, etc.

Coke and Coal Chemical Materials in 1946—Prepared by Maxine M. Otero, J. A. DeCarlo, and J. A. Corgan, chief, Anthracite and Coke Section, under the supervision of T. W. Hunter, chief, Coal Economics Division, Economics and Statistics Branch, U. S. Dept. of the Interior, Bureau of Mines. This discussion is referred to as Mineral Market Report M.M.S. No. 1537. The report contains 23 selected tables showing final statistics of the coke industry for 1946.

The Electronic Way—Published by Minneapolis-Honeywell Regulator Co., Minneapolis 8, Minn. This little eight-page booklet is designed to serve as an introduction to the electronic age. It is written in non-technical language with the purpose of removing the mystery from the simple science of electronics. Copies free upon request.